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HUGH ROBERT MILL

By the death of Hugh Robert Mill on 5th April 1950 modern Geography has lost one of its most strenuous advocates, and scores of geographers have lost a devoted friend and kindly critic.

After a youth spent mainly in Caithness, where his father was a doctor in Thurso, bad health interfered with his schooling, but in 1879 he went to Edinburgh University and specialised in Chemistry. The influence of the *Challenger* was strong in Edinburgh in those days, and it is little wonder that an inquiring mind fell under the influence of John Murray. There were other great men, too, who had their influence on Mill, namely, James Geikie, Crum Brown, T. G. Tait, J. Y. Buchanan, and others. Mill became an active worker in the Scottish Marine Station at Granton where he gathered material for his D.Sc. Thesis (1886), and later took a leading part in the survey of the Scottish lochs and English lakes.

From 1887 to 1891 he was Lecturer on Geography and Physiography in the Heriot-Watt College and Extension Lecturer for St. Andrews and Edinburgh Universities. In 1885 he was concerned with the movements which led to the founding of the Scottish Geographical Society, and for some years thereafter contributed to this *Magazine* a considerable number of valuable papers and articles, also his "Recollections of the Society's Early Years," published on the occasion of the celebration of its fiftieth anniversary.

In 1892, however, he left Scotland on being appointed Librarian to the Royal Geographical Society. He resigned from this post in 1900, but continued to serve the Society all his life in various ways, and notably as the author of its *Record*, a centennial publication in 1930. About 1900 those who were anxious to see a Lectureship in Geography established in Edinburgh—and elsewhere—hoped that Mill would be the first to hold it; but unfortunately the plans had not matured sufficiently. So instead of returning to Scotland he took over the British Rainfall Organization. This was a private venture of G. J. Symons and under Mill's guardianship it reached a very high pitch of efficiency. In 1919 the Organization passed to the Royal Meteorological Society and the Air Ministry, and Mill had more time

to devote himself to his second great interest in life, namely, the history of Antarctic exploration.

This interest showed itself in his *Siege of the South Pole*, his *Life of Sir Ernest Shackleton*, and in dozens of introductions to books by other authors. There can be no explorer of recent times whom Mill did not know personally, and when his eyesight failed, as it did in later life, he knew every explorer by his voice. His unique library of some 500 books contains practically everything that has been written on the Antarctic in all languages. He has given this library to the Scott Polar Institute in Cambridge. Mill's name figures largely on the map of Antarctica: for instance, Mill Glacier—a tributary of the Beardmore, Mill Rise in the Southern Ocean, Mill Peak in McRobertson Land, Mill Cove in the South Orkneys, and others.

He was an Honorary LL.D. of St. Andrews (1900), President of Section E of the British Association (1901), Victoria Medallist of the Royal Geographical Society (1915). In 1923, " for his long-continued geographical work of a high order," he was awarded the Royal Scottish Geographical Society's Gold Medal. He was President of the Geographical Association (1931) and a Commander of the Norwegian Order of St. Olav. He was besides an honorary member of almost every geographical society in the world. Mill was an outstanding lecturer even when, in later life, he could not make use of notes. Precision and clarity, too, mark all his writings. He was a prolific author, but he considered his small book *The Realm of Nature*, published in 1891, to be his best work : there he expounded his ideas on physical geography. His *Life Interests of a Geographer*, published privately in 1944, is a voluminous autobiography and an account of his ideals as a geographer.

Members will be gratified to learn that by a provision of his will this notable scientist has given a tangible proof of his continued belief in the aims of this Society which he helped to create.

R. N. R. B., with I. B. and A. G. O.

GEORGE WALKER

Barely two years ago George Walker retired from the Secretaryship which he had held for twenty-three years and on completing half-a-century's service devoted to the Royal Scottish Geographical Society, carrying with him all good wishes for his future well-being. These wishes were not to be fulfilled, and by his death on 15th January the Society has been deprived of a valued friend. Due appreciation of his services was expressed and recorded at the time of his retiral. There remains to be recorded here the deep sense of personal loss sustained by his very many friends.

J. H. K.

ISAIAH BOWMAN

Geographers everywhere are conscious of the loss their science has suffered by the death on 6th January of Dr. Isaiah Bowman who had recently retired from the Presidency of the Johns Hopkins University, Baltimore ; for they have been aware, in varying degrees, of his great influence in promoting sound scholarship and in raising the status of geography. A much wider circle know something of his contribution, during and after both World Wars, to the sane organisation of peace in the world ; the present American Secretary of State recently referred to him as " one of the architects of the United Nations." Those who knew Bowman, and especially those who worked with him and benefited from his inspiration, will remember him as a man endowed with great integrity of purpose, remarkable intellectual gifts, tremendous energy and resilience. These qualities he devoted enthusiastically to the service of geography, as a teacher at Ypsilanti and at Yale, and as Director of the American Geographical Society of New York from 1915 to 1935. Thereafter his administrative ability and his strong personality were invaluable to a famous university during a difficult phase in its history.

This Society awarded him the Livingstone Medal in 1928. The grounds of the award were recited in some detail when the presentation was made, and they were recorded, along with Bowman's speech, in the *Magazine*.[1] He fascinated his audience in giving, at our request, some account of the work of the New York Society which owed him so much ; for it was a tale of outstanding achievement in the production of books and maps of real importance, but generally such as otherwise would never have been written or drawn. Since then, the Society has accomplished a great deal more and has become recognised as a unique institution in North America, exercising valuable influence, there and far beyond, in a great many ways. It is safe to say that but for Bowman this could scarcely have happened. He set an example which other geographical societies should try to follow if they would survive and justify their existence. They will be most likely to do so if they adopt Bowman's method, which may perhaps be stated briefly : first encourage research of ever better quality ; secondly, co-operate with workers in all related fields of knowledge ; and thirdly, by attacking real problems that have practical applications, demonstrate that geography has a genuine and unique contribution to make in promoting the well-being of humanity.

A. G. O.

[1] *S.G.M.*, 1928, 44 (5) : 292-297.

CLIMATIC REGIONS AND CLIMATIC NUMBERS

By Arthur Davies

The purpose in framing a classification of climates is threefold: philosophical, scientific, and educational. From the educational standpoint "it is a prime need of any scheme of geographical education that it shall provide a simple world framework within which later acquired knowledge can always find a place." [1]

The scientific need is to condense, digest and analyse the great mass of climatic data available for the earth's surface. Only by classifying and generalising does it seem possible to produce order out of chaos.

But what kind of order poses a philosophical problem? A mathematician would select a rational division based on quantity—*e.g.* 10 inches, 20 inches annual rainfall, and so on—and combine this with quantitative divisions based on temperature. This would result in a bewildering complexity of climatic types, but with the distinct merit of still representing climatic data.

But the late nineteenth-century passion for natural history, which fired many pioneer scientific geographers, led to a search for 'natural' boundaries for climatic regions. This resulted in what have been termed "vegetation maps climatically described." They persist to this day. Thus Supan selected the mean annual temperature of 68° F. as the limit for tropical climates, because he considered that it coincided with the poleward limit of the palm tree, and 50° F. for the warmest month as the temperate limit of Polar climates. Though these estimates are no longer generally accepted as valid, the more recent classifications of climates, by Köppen and by Miller, differ in detail, not in principle, in their selection of boundaries. Both use natural vegetation as a basis for climatic classification, and both are justified if it can be established that types of vegetation afford reasonably good indices of climatic conditions in their regions of distribution. If this were so, then maps of vegetation would furnish a remarkable addition to the observed climatic data, which are still skeletal in many regions of the world.

The drawbacks of this approach are serious. To begin with, the major plant associations outside the tropics appear to be in process of change toward various plant climaxes and are, moreover, the result of a great number of factors in addition to climate. The absence of competition from other species, due to Quaternary glaciation and to mountain, desert or swamp barriers, has profoundly influenced the distribution of natural vegetation. Animal interference, especially of the 'hoof and horn' animals, has changed the vegetational face of the earth in all sorts of ways, and more so in the Old World than in the New World which was isolated by sea and received few Ungulata. Man, both as primitive cultivator, advanced cultivator and pastoralist, has completely altered the pattern of natural vegetation over vast regions. Tropical forest has given place to bush, scrub, and savanna; coniferous forest to Calluna heath in North West Europe; deciduous forest to grassland in the Great Plains—all as the result of animal and

human interference. Moreover, the tolerance of many species is so considerable as to spread over as many as three or four significant climatic types. In Europe the oak is equally at home in England and in East Central Russia, while spruce and pine grow easily in Aquitaine and Finland. It is more than doubtful, therefore, whether natural vegetation can serve as an index of climate, and certainly at best it can only do so in an extremely generalised way based on very broad vegetation types such as deciduous forest, coniferous forest, Mediterranean vegetation types, and so on. When generalised to this degree, vegetation distributions do not add significantly to the climatic data already known.

From the philosophical viewpoint, too, it is high time that the human geographer protested at the over-long domination of the ideas of plant ecology in our studies of climate. Plants take second place to man as our object of study. There are many climatic elements more important to the life, well-being and economy of man than those which govern, or seem to govern, natural vegetation. Thus, for example, Miller bases his classification on five climatic elements significant in natural vegetation ; three of them are the number of months with average temperatures over 43° F. required for (1) broad-leaved evergreen forest, (2) deciduous forest, and (3) coniferous forest, respectively. The other two are the length of the season when plant growth is inhibited by reason of drought or cold. The season of rainfall is used but not the amount, and no information is incorporated as to the average temperatures of the coldest and the warmest month. Aspects of climate fundamental to man are passed over in this classification in order to concentrate on those which chiefly matter to trees. Thus C2 (Cool Temperate Continental) means only that there are between one and five months with average temperature below 43° F. and that rainfall comes mainly in summer. This is hardly an adequate basis for climatic knowledge, and it is not surprising that climatic data of about thirty stations for each type of climate are appended to this classification. The great merit of Miller's work is not in his scheme of classification but in the truly admirable descriptions with which he fills in the scheme, which render his work amongst the most valuable yet produced by a British geographer. Köppen departs even further from an adequate climatic representation in his scheme, where, for example, Region C (Temperate Climates) denotes a coldest month of *between* 27° and 64° and a warmest month of *more than* 50°. This is too vague to be satisfactory as a picture of world climate in human geography, however convenient it may be for vegetation studies.

Scientifically all attempts at classification of climate have tried to reduce chaos to order, to render complexity more intelligible. The only true climatic regions, regions where climatic conditions affecting man and his work are reasonably uniform, are so small and so numerous as to defy classification or tabulation. Every locality is in fact unique. The world map of climate is truly a mosaic of a thousand parts or more. To reduce the thousand regions to twenty or so, capable of being grasped and memorised, is a policy of educational convenience, not of scientific method *unless* it facilitates analysis and explanation. This

analysis has signally failed in climatology, which is not surprising since the areas or regions discussed are vegetation regions, not climatic ones. The explanations of the climates of the earth's surface are not yet known, or known only in part. They await a greater knowledge of the circulation of the atmosphere at all levels above the earth's surface, and of the profit-and-loss account of the atmospheric engine in relation to solar radiation. These are problems in dynamical meteorology and no generalisations of the climate at the earth's surface are likely to facilitate their analysis, for climatic data at best are only mathematical averages. Two-dimension analysis can give little help in solving three-dimensional phenomena, especially when it does not include the major factors affecting movement of air masses, *e.g.* pressure, moisture content, etc. By elimination therefore the only remaining possibility of value in classifications of climates is educational ; to provide convenient ways of condensing a great mass of climatic facts so that they can be more easily acquired, understood, evaluated, and remembered. None of them satisfactorily passes this test.

Köppen's classifications have two serious disadvantages. Firstly, they are based on five major vegetation groups, subdivided into fifteen main divisions and into fifty or so minor sub-regions. Fifty regions are too many for their boundaries or qualities to be remembered. Secondly, their description—nomenclature—is German in origin, *e.g.* BSW, presenting added difficulty in understanding and memorising for all but German students. It is imperative that any successful framework of world climate should use universally comprehended rational or mathematical terms to describe climate, not linguistic ones. Köppen's work is a classic for its collection of data and description of climate for every region in the world. Educationally his world classification will always be admired but rarely remembered, and so seldom used.

Miller's classification, so widely used in Britain, is a model of clarity and simplicity, easy to understand and remember. Inevitably, however, it conceals the great variation of climate within each region. Thus D2 extends from the Yukon, through the prairies of Saskatchewan to include the St. Lawrence region and Newfoundland. Again C2 extends from New York to the Rockies, and in Europe, from Prague to across the River Volga. Within this generalised region important differences are concealed :—

STATION	JAN. (AVER. TEMP.)	JULY (AVER. TEMP.)	ANNUAL RAINFALL
Budapest . .	28° F.	70° F.	25 ins.
Stalingrad . .	13° F.	74° F.	11 ins.
New York . .	31° F.	74° F.	43 ins.

It is possible to regard Budapest as having one of the best climates in the world ; that of Stalingrad is hard on man, animals, and crops ; while New York in July and August is a place to get away from, if possible, because of its sticky heat and high relative humidity.

One criticism can be levelled at all schemes of climatic classification intended to cover the world : if they are generalised enough to be ' memorable ' they are already too generalised to be valuable.

C. R. Thornthwaite in *Geographical Review*, 1948, presented a scheme which gave a technical tool with which the agronomist can estimate P.E., Precipation Effectiveness. The formulae and graphs used are too complex for general use in climatic studies. He shows one climatic element only, the degree to which the water need of each crop is met in given regions. While this is of paramount importance in the pioneer lands of recent settlement, it is only truly significant in those parts where water is marginal to need. In three-quarters of the world water is either superabundant or definitely inadequate. Moreover, in the Old World irrigation, farming practice and age-long human experience have already proved themselves, and no calculations of P.E. can there add significantly to human knowledge of the problem ; it can only convert such knowledge into numbers. For these reasons Thornthwaite's work on P.E. has only limited possibilities of application in marginal lands, and is not a sufficient basis for the study of world climates in human geography.

Yet a framework for world climate is badly needed in the study of geography. It must include the following essential features :—

1. Direct representation of climatic data, not " vegetation maps climatically described."
2. The data must show approximate average temperatures for the coldest and the warmest months, total annual rainfall, and season of physiological rest—if any.
3. There should be no theoretical boundary patterns enclosing misleading uniformity in over-generalised climatic regions.
4. It should be easily memorable, universally comprehensible, and readily evaluable.

Attempts at meeting these requirements have hitherto relied on two devices, both unsatisfactory because they involve too great a strain on the memory.

First is the series of maps showing : (1) January isotherms of the world or of a continent, (2) July isotherms, (3) winter rainfall, (4) summer rainfall. The intention is good, but to remember the climate of a place the student has to visualise four different maps, each with a completely different pattern of theoretical lines, and each line with a precise number, failure to remember which leads to error. Few persons can memorise such a series of maps *for any length of time.* Moreover all temperatures given are corrected to sea level, a demerit in a summary of climate. Again temperatures are not at their lowest or highest in January and July all over the world. Within the tropics there are usually two hot seasons and two cooler ones, rarely corresponding with January and July. The regions around the Mediterranean Sea generally have higher average temperatures in August than in July. In N India the hot season is May–June, before the rains. Isotherm maps are synoptic, and January and July isotherms cannot give the coldest and the hottest monthly averages for more than half the world.

The second device is the fashion to draw a graph of average monthly temperature for each month in the year at innumerable places of

importance, and also one of rainfall. This is a diabolical invention for destroying interest in climate, for it imposes an absurd and unnecessary strain on the memory. The rainfall graphs are difficult to compare in total rainfall because the eye has to sum up twelve monthly

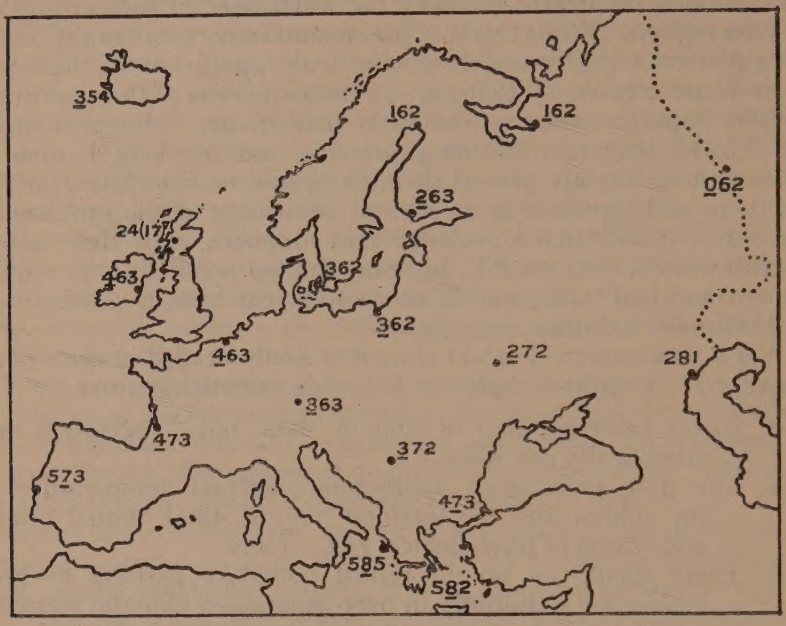

Fig. 1. Europe : Climatic Numbers.

Reykjavík	354	Haparanda	162	Archangel	162
		Helsinki	263	Sverdlovsk	062
Ben Nevis	24 (17)	Copenhagen	362	Gdańsk	362
Dublin	463	Ostend	463	Kiev	272
		Munich	363	Astrakhan	281
Bordeaux	473	Belgrade	372	Istanbul	473
Lisbon	573	Corfu	585	Athens	582

Notes. Digits in black type, underlined in Figs. 1-6 indicate season of physiological rest.

Ben Nevis gives an indication of the very wet mountain moorlands of NW Europe. It should not be used for interpolation apart from these. Precipitation is 171″.

Italian stations are generally 45°, 76° and 25″, which do not lend themselves to the approximation used.

Key. Reykjavík : coldest month, 30° F. ; warmest month, 50° F. ; annual rainfall, 40″ ; physiological rest in winter. Athens : coldest month, 50° F. ; warmest month, 80° F. ; annual rainfall, 20″ ; physiological rest in summer.

instalments to do so. Their only achievement—a bad one—is that they provide a standard exercise for school homework.

The four essential requirements can be met by climatic ' spot heights ' plotted as *climatic numbers* for selected stations. This combines (1) the cartographic methods of spot heights and interpolation,

(2) the universal use of numbers for evaluation and understanding, and (3) the mnemonic principles established by common experience.

The last point will be discussed first. It is easy to remember a sequence of four digits but not one of five or six. Dates in history have accustomed us to that. Telephone numbers reveal the same human capacity for recalling four but not five. A similar experience is common

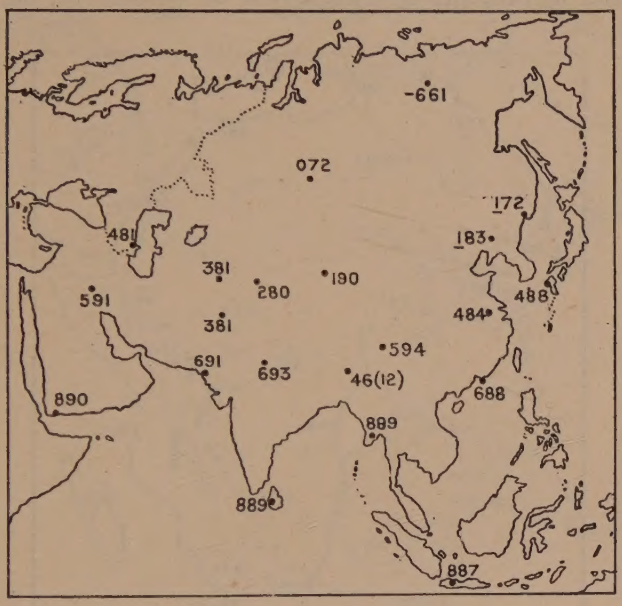

Fig. 2. Asia : Climatic Numbers.

		Tomsk	072	Verkhoyansk	−661
Baku	481	Samarkand	381		
		Kashgar	280		
		Lukchun	190	Mukden	183
				Vladivostok	172
Baghdad	591	Kabul	381		
		Delhi	693		
		Darjeeling	46 (12)	Chungking	594
				Nanking	484
				Nagasaki	488
Karachi	691			Hong Kong	688
Aden	890	Rangoon	889		
		Colombo	889	Batavia	887

to those who use four-figure forms in Military and Civil Service, business catalogues, etc. The climate of any place selected can be represented by a climatic number of four figures and can be mapped in its correct position. Now any place on the earth's surface will in practice on the map lie within a triangle formed by the three nearest climatic numbers. By interpolation between these three nearest 'spot heights' the climatic number of any place can be estimated at a glance.

The four digits will represent (1) coldest monthly average temperature in degrees Fahrenheit, (2) warmest monthly average temperature, (3) total annual rainfall in inches, (4) season of physiological rest, if any. Take, for example, Helsinki (Finland) with 18°, 62°, and 28 inches ; season of physiological rest is winter. This would give 18, 62, 28, but by allowing an approximation of 2° in temperature and 3 inches in rainfall, Helsinki could be written 20, 60, 30. The

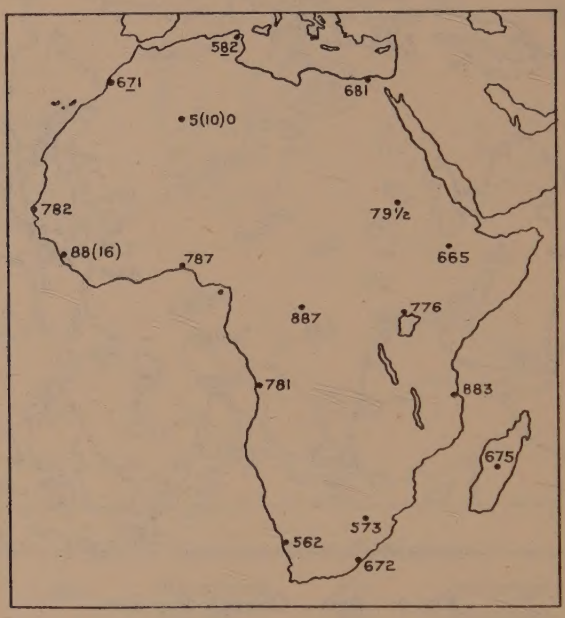

Fig. 3. Africa : Climatic Numbers.

		Tunis	582	Alexandria	681
Mogador	671	Insalah	5 (10) 0		
Dakar	782			Khartoum	79½
Freetown	88 (16)			Addis Ababa	665
		New Antwerp	887	Entebbe	776
Luanda	781			Lindi	883
		Pretoria	573	Antananarivo	675
Port Nolloth	562	Port Elizabeth	672		

Note. Where the season of physiological rest is not indicated, plant growth is possible throughout the year if the third digit is 2 or more, *i.e.* 20″ or more.

zeros are omitted and the climatic number becomes 263. Thus, for example, Wellington (New Zealand) has a climatic number 564. This means 50°, 60°, 40 inches and no season of physiological rest. Its actual data are 48°, 62°, and 40 inches. This approximation within 2° and 3 inches is tiny compared with the vagueness of Köppen's and other schemes of classification already mentioned.

The construction of a framework of climate for each continent

consists in selecting about eighteen well-distributed stations whose data can be approximated to four digits. They should be towns whose location is well known. To interpolate within a triangle of three of

Fig. 4. North America : Climatic Numbers.

Dutch Harbor	356	Dawson	−261		
		Chesterfield Inlet	−351		
Victoria, B.C.	463	Calgary	162	St. John's, Newf.	266
Portland, Ore.	474	Port Arthur	162	Montreal	174
				Boston, Mass.	374
San Francisco	562	Salt Lake City	382		
		St. Louis, Mo.	384		
		Phoenix, Ariz.	591	Charleston	584
		San Antonio	583		
		Mobile	586	Miami	786
				Key West	784
Mazatlan	782	Vera Cruz	786	Havana	785
		Guatemala	675		

these climatic numbers the first digits are noted and the interpolation of that first element decided, then the second, and so on. Such a scheme is illustrated in the text-figures. In Fig. 4 (North America) Nashville by interpolation is 485 ; its actual data are 39°, 79°, and 47 inches.

These spot heights, mapped for each continent on a larger scale than can be shown here, do not obscure the map, which can therefore be used to show another element distributed continuously, *e.g.* P.E., total annual sunshine, average relative humidity, etc. To assist interpolation, however, the most useful base map would show contours at 500

Fig. 5. South America : Climatic Numbers.

Colon	88 (13)				
Balboa	887	Bogotá	666	Georgetown	889
		Manáos	887	Pará	88 (10)
Callao	770	La Paz	452	Rio de Janeiro	784
Antofagasta	670	Asuncion	685	São Paulo	675
		Cordoba	573		
Santiago	571			Montevideo	574
Valdivia	56 (10)			Bahia Blanca	572
				Santa Cruz	360
				Falkland Islands	453

feet intervals. The reader should use 3° F. drop in temperature for each 1000 feet increase in height as a fair approximation for this purpose.

It is not advisable for a world map to be constructed and presented in this way, for the array of one hundred climatic numbers might well discourage the beginner. If climate is taught on a continental basis

in regional geography, the eighteen climatic numbers can be permanently memorised within as many minutes. For just as historic

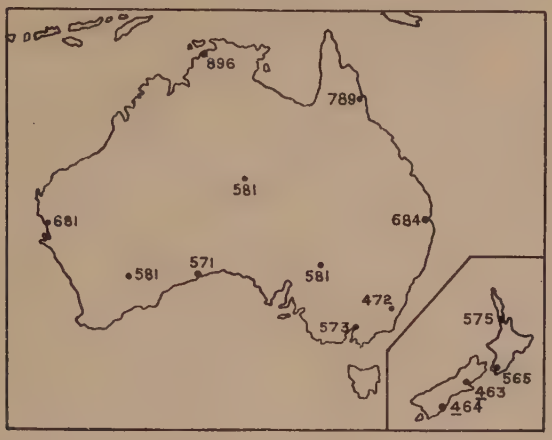

Fig. 6. Australia and New Zealand : Climatic Numbers.

Port Darwin	896			Cairns	789
Carnarvon	681	Alice Springs	581	Brisbane	684
Coolgardie	581	Broken Hill	581		
Eucla	571	Melbourne	573	Canberra	472
		Christchurch	463	Auckland	575
		Dunedin	464	Wellington	565

sequence helps us to remember dates, so geographic sequence in space, where each climatic number grades easily from its nearest neighbour, helps us in memorising from the map.

To select the climatic numbers shown in figures 1-6, the records of four hundred meteorological stations were consulted.[2-5]

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NEW ZEALAND AND THE SOUTH WEST PACIFIC

By Kenneth B. Cumberland

It is not widely recognised how many are New Zealand's territorial interests and social responsibilities in the south west Pacific. The Dominion's Pacific ' neighbourhood ' extends from Wellington to the pole in one direction, half way from Wellington to San Francisco in another and almost half way to Tokyo in a third. The Dominion ' proper ' includes North Island, South Island, Stewart Island and the Chathams. In higher latitudes are a series of scattered, wind-swept, cloudy islands not permanently inhabited—referred to usually as the ' outlying ' or ' subantarctic ' islands—including the Auckland, Antipodes, Bounty, Snares, Solander, Campbell and, just north of Cape Maria van Diemen, the Three Kings Islands. South again is the Ross Territory of Antarctica with a mainland area almost twice as large as the Dominion ' proper.' In warmer climes to the north lie the ' annexed ' island territories : Niue, the seven strewn high volcanic and raised coral islands of the Southern Cook Group, the eight minute scattered low coral atolls of the Northern Cook Group, and the three islets, recently annexed, which constitute the Tokelaus. In addition there is the economically and politically significant territory of Western Samoa—the larger volcanic islands of Upolu and Savaii—administered by New Zealand under mandate from the League of Nations from 1920 to 1946 and subsequently as a trust territory of the United Nations. Jointly with the Imperial and Australian Governments, New Zealand is responsible for the administration of Nauru, the phosphate deposits of which small equatorial island are so significant in the Dominion's agricultural prosperity.

New Zealand's direct territorial responsibilities extend then from the equator to the pole and through 45 degrees of longitude : they embrace both arid ice desert and tropical isles of luxurious plant growth and bestride Polynesian, Melanesian, and Micronesian culture areas. If we include the Crown Colony of Fiji, the independent island kingdom of Tonga, and American Samoa, administered by the United States Navy, there is within New Zealand's Pacific island ' neighbourhood ' a polyglot population of almost half a million people —Polynesian, Melanesian, Micronesian, Indian, Chinese, and of mixed blood. The administration of such scattered and often inaccessible territories, and the political, social and economic responsibilities implicit in formal acceptance of the ideas of ' trusteeship,' present New Zealand with manifold and formidable problems, the solution of which can only be based on a very much wider and deeper knowledge of the dependent territories than is now available. Some of the basic problems in question were briefly described in 1949.[1] Recognition of the basic deficiencies of factual information about the islands and their peoples goes far to explain New Zealand's eagerness to act as host to the 7th Pacific Science Congress—which was held in Auckland and Christchurch in February, 1949—and the Dominion

Government's wholehearted support for, and participation in, the South Pacific Commission.

The South Pacific Commission appears designed and destined to play a large part in ensuring improved administrative policies and objectives and in securing for island communities better standards of economic and social attainment. The Commission was established

The Dominion of New Zealand and Pacific island neighbourhood.

when an agreement drawn up in Canberra in 1947 was ratified by Governments of Australia, New Zealand, the United Kingdom, France, the Netherlands and the U.S.A. The Commission has set up its headquarters at Noumea, and late in 1948 appointed its executive staff and principal research officers. Suva, Fiji, was to be the venue early in 1949 of a conference, called by the Commission, of native representatives of all the island territories between, and including, Netherlands New Guinea and Tahiti.

The Commission's rôle is purely advisory and its function mainly to conduct research—if possible through existing institutions—so as to provide the basic data upon which advice must be founded. It is unfortunate that, despite its deep and widespread Pacific commitments, New Zealand has no institution designed to prosecute original work in the dependent territories or to co-ordinate scattered independent research conducted from New Zealand. Geography and anthropology are sciences which until recently have been conspicuously neglected in the Dominion. Apart from sporadic and individual work in the fields of geology, botany, zoology, meteorology, and ethnology, New Zealand has made few contributions towards the solution of the limitless and enthralling problems—physical and social—which the multifarious island territories offer. But with the establishment of chairs of geography and the impending creation of a chair of anthropology in the University of New Zealand, the prospect at the moment is brighter. Australia, however, with its eyes open at last to the prospective economic and strategic importance of Papua - New Guinea, has gone much further. While New Zealand recruits its island administrators from the Income Tax, Post Office, and similar departments of government, Australia has long provided specialist courses in anthropology, colonial history, and Pacific languages for its administrative officers. The Commonwealth government in establishing recently the National University at Canberra has also made generous provision for fundamental research at the highest level into the problems of the dependent territories.

With the recognition of New Zealand's responsibilities in these matters and the establishment of the South Pacific Commission it now becomes apparent that better facilities must be provided within the University of New Zealand for the study of New Zealand's numerous and scattered island territories and their social, economic, agricultural, land use, conservational and other problems, and for the better training of administrative staffs and of students from the dependent territories. The nucleus of a School of Pacific Studies will exist at Auckland University College when the projected Department of Anthropology is established alongside existing Departments of Geography, Economics, and History, members of the staff of which have already done work in the Pacific island territories. The time is opportune : the problems were never more urgently in need of solution.

Photographs by courtesy of the High Commissioner for New Zealand.

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SUVA

VITI LEVU, FIJI

LAUTHALA BAY

RAROTONGA: MAIN STREET

SAMOA: CEREMONIAL PREPARATION OF KAVA AT APIA

THE DISTRIBUTION OF POPULATION IN ABERDEENSHIRE, 1696

By Kenneth Walton

An opportunity to make a detailed study of the distribution of population at the end of the seventeenth century is not often available. For the glaciated Lowland and Highland plateaux of Aberdeenshire, however, the preservation of the Poll Tax Returns of 1696 [1] affords excellent material to the geographer wishing to make a study of past population distributions. An earlier Poll Tax had been unsuccessfully imposed in 1693. In 1695, the Scottish Parliament, realising the importance of increasing the efficiency of the Army and Navy to combat danger from foreign and internal enemies, imposed a new Poll Tax to augment existing sources of revenue. The Returns, which apart from Aberdeenshire and Renfrewshire are only available for a few parishes in Scotland, give a detailed account of the name, status, place of residence and occupation of every person who was above the age of sixteen and not a burden on the parish. From the Returns also, interesting information is available as to the type of settlement and population grouping in the period before reclamation and enclosure changed the face of the landscape.

Population maps were constructed from the data by plotting the distribution of all the settlements given in the Poll Book on a scale of one inch to the mile, with frequent reference to six-inch maps. The large-scale maps were then reduced photographically to give a more comprehensive view of the whole county (Fig. 1). The continuity of settlement names to the present day made the location fairly straightforward except in two cases. Firstly, extensive depopulation in the Highland zone has since taken place with consequent loss of knowledge of settlement names and sites, and, secondly, in a few instances data for an estate alone are given without itemised information as to the settlement within the estate. In such cases, reference to old maps and plans, and former areas of reclaimed land gave a clue to probable sites, and the dots were inserted with due regard to slope and other geographical factors. The lacunae are the result of anomalies in county boundaries. Prior to the boundary changes of 1890, certain portions of Banffshire were detached and surrounded by the county of Aberdeen—*e.g.*, St. Fergus parish on the coast north of Peterhead, while areas situated in Aberdeenshire in 1696 are now located in Banffshire, especially the eastern portion of the high Cabrach Basin, and the northwestern extremity of King Edward Parish near the mouth of the Deveron.

As will be seen from Fig. 1, in which each dot represents five persons actually enumerated in the Returns, there was a characteristic arrangement of the population, which has since changed owing to the great changes introduced by the Union of 1707, the political revolutions of 1715 and 1745, and the agricultural revolution of 1750-1850. This map therefore gives an excellent indication of the settlement before the dispersion due to enclosures and reclamation,

FIG. 1. Aberdeenshire: Distribution of population in 1696. One dot represents five persons.
Based upon the Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office.

and the erection of the new planned villages which coincided with it. Apart from the urban population of the Royal Burghs of Aberdeen, Inverurie and Kintore, and the various Burghs of Barony, the bulk of the population lived in the characteristic nucleated group of the period —the kirktowns, milltowns and seatowns, and the ubiquitous farming townships based on the infield-outfield system of agriculture. These townships, consisting of varying numbers of people, were usually inhabited by a tenant holding the land from the laird, and a number of subtenants, with subsidiary cottars known as grassmen, who had no land and usually combined a trade with their agricultural work. The occurrence of Cot-towns in the Returns and present-day settlement names seems to indicate that the cottars may have lived slightly apart from the main township. The most characteristic unit—assuming five persons per household—ranged from three or four to rarely more than seven or eight households, while the status of the tenants occupying them varied in the Lowland and Highland parts of the county. " Whereas in the Highland tracts these (units) were most commonly those of the joint tenants with or without a gentleman tenant above them, in the Lowlands there were commonly two tenants, with servants, a subtenant and two or three cottars." [2] Occasionally larger hamlets were found, with tradesmen, weavers, tailors, shoemakers, merchants, and so on.

To construct the density of population map (Fig. 2), the population as enumerated in the Poll Book was adjusted according to the method employed by Webster in his population census of 1743-1755. Since the clergy engaged in the Webster census only counted examinable persons over six—the age varied between six and nine in a few parishes —Webster added two-ninths' part of the number of examinable persons to represent the number of children.[3] The Poll Tax Returns, however, include only persons above the age of sixteen not dependent on charity, so Webster's factor was raised to one-third to account for the increased number of children compared with 1755 and paupers. No claim can therefore be made for the absolute accuracy of the population figures for either of these dates.

The population returns for 1696 are also probably low since they were made in a period of great famines and high mortality rate of old and young—the Seven Ill Years at the end of the seventeenth century. A century later the famines and deaths are recalled in the Old Statistical Account. There seems to have been a regional variation in the effect and extent of the scarcity. Better lands such as the Garioch, the East coast of Buchan and the lower Ythan Basin suffered least, but poor transport facilities prevented the dispatch of any surplus to areas of dearth such as the interior of the Buchan Lowland. In the parish of Monquhitter the tale was indeed woeful : " Of sixteen families that resided on the farm of Littertie thirteen were extinguished. On the estate of Greens, which presently accommodates 169 individuals, 3 families (the proprietor's included) only survived. The extensive farms of Touchar, Greeness, Overhill and Burnside of Idoch, now containing more than 100 souls, together with some farms in the parish of Turriff, being entirely desolated, were converted into a sheepwalk

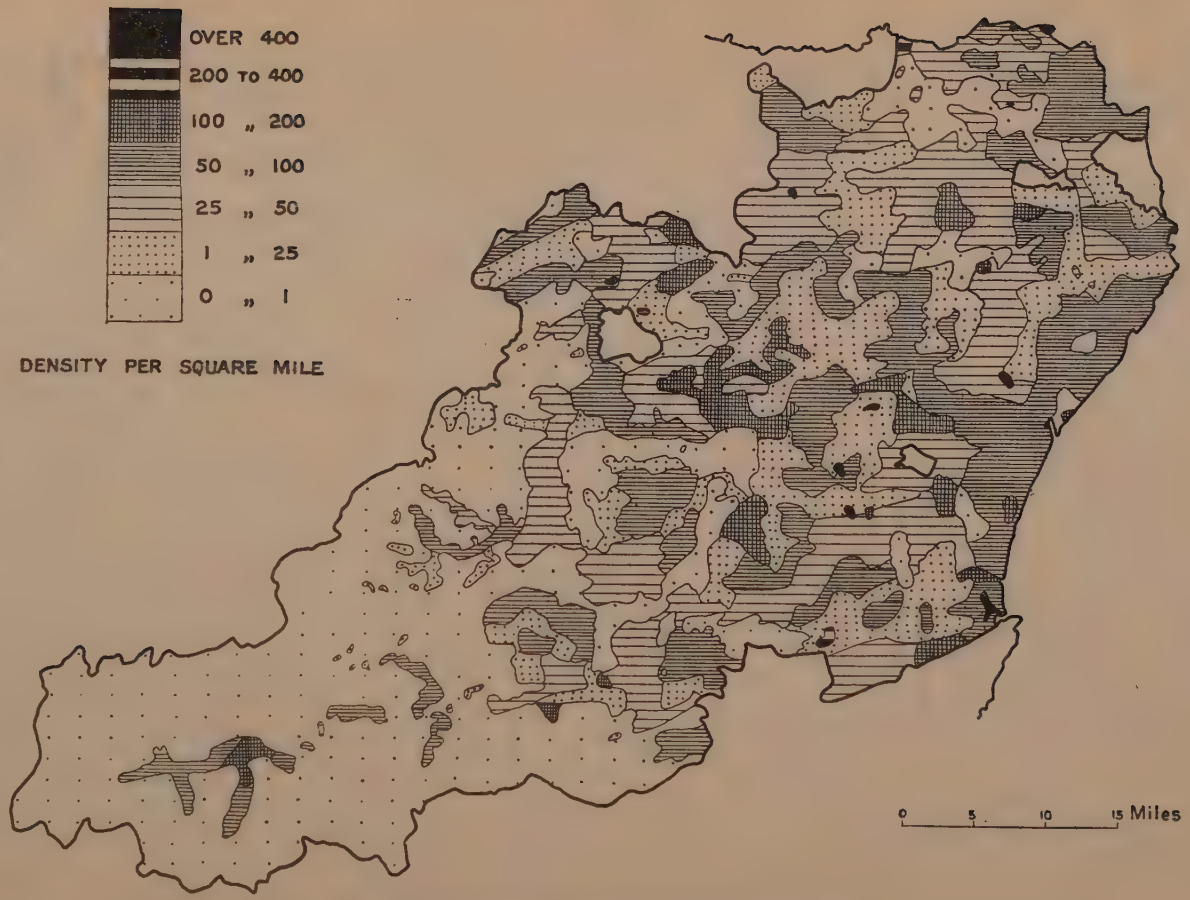

FIG. 2. Aberdeenshire: Density of population in 1696.

Based upon the Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office.

by the Errol family to whom they then belonged." [4] For the poorer agricultural regions, at least, the Returns do not give the true picture numerically for the latter part of the seventeenth century. Nevertheless an analysis of the population distribution in pre-enclosure days is very valuable, both intrinsically and as a starting point for research on the changes in distribution which were later to take place.

Basically Aberdeenshire consists of a lowland region, washed by the sea in the east and north, with an upland or mountainous rim to the south and west. Only at the south-eastern and north-western extremities of the Lowland is there easy connection with adjacent regions. The region is mainly composed of stepped glaciated plateaux, probably uplifted erosion surfaces now in various stages of dissection, which increase in altitude from the sea towards the west. They are developed on a highly complex structure of closely folded and faulted metamorphic and sedimentary rocks with a SSW-NNE trend, whose continuity is broken by large masses of plutonic and hypabyssal intrusions. The plateaux are drained and dissected by the main consequent streams of the Dee and Don, which have a roughly west-east alignment. The directions of these and other rivers have been complicated by capture by strike streams and glacial diversions. The coast is composite in character, showing erosional features with cliffs in the north, and a mainly low sand-dune fringed coast in the east.

The varying dissection of the plateaux gives three well-marked relief areas in Aberdeenshire. Lowest and most extensive is the Buchan Platform, mainly 400-600 feet high with few slopes over 5°, and often poorly drained on the boulder clay, except where the slopes of the mainly shallowly dissected valleys give quicker run-off of surface water. The asymmetrical scheme of relief, climate and soil has always tended to push the intensity of economic life towards the transitional zones : towards the gap to the Moray Firth Lowlands in the north west, and to the Kincardineshire Plateau in the south east. Here, on the lowest of the routeways to the south, was the Royal Burgh of Aberdeen, comprising the twin towns of Old and New Aberdeen which still retain their individuality. At that time Aberdeen had a total population of about 5100. Its Freedom Lands to the west, a poor infertile boulder-covered waste, were very sparsely populated. The other areas of high density also mark urban populations of which prominent are the fishing towns of Peterhead and Fraserburgh, the latter founded only about a century and a quarter before. Nestling along the raised beaches of the coast were the small fishing hamlets, some of which have since disappeared. The most interesting features of the distribution, however, are to be seen inland. Of striking importance is the discontinuous and scattered pattern of the higher density areas with 100-200 persons per square mile. The breaks in the distribution are the result of a complex interrelationship of physical, biological and economic factors acting on the glaciated lowland landscape, which resulted in only a very restricted amount of land being available for cultivation with the technique and implements of the pre-agricultural revolution economy. Separating each small tract of infield and outfield, and indeed interspersed with it, were

FIG. 3. Insch and Garioch Lowland. Distribution of population in 1696, in relation to slope and deep dry soils. One dot represents five persons. Based upon the Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office.

barren, mainly marshy wastes, peat bogs and infertile often stony moorland, usually coinciding with the interfluvial areas. Even the better riverine or haugh lands which produced good crops of oats and barley were liable to periodic flooding. The peaty areas of the wastelands, however, played an important part in the economy and seasonal rhythm of work, since they provided the essential fuel of the pre-coal era.

One of the best populated areas in the county was the Insch and Garioch Lowland, developed on the gabbro intrusion between the slates of the Foudland Hills in the north, and the granite mass of Bennachie in the south. As a result of the soil survey made by the Macaulay Institute, it is possible to correlate the distribution of deep fertile soils with the sites of the farming townships in this area of high population density, long famed as the "granary of Aberdeenshire." [5] The relief of the boulder-clay covered lowland may be roughly divided into three areas : a western district of low relief about 700 feet above sea level, a central area of high relief with conical hills such as the Hill of Christ's Kirk and Dunnideer diversifying the landscape, and an eastern tract of low relief shallowly dissected by the Urie and its left-bank tributaries. The scale of relief can be judged from the slopes in Fig. 3. The main area of steep slopes within the lowland is the north-south belt lying to the west of Insch which corresponds with the area of high relief. Elsewhere slopes are less than 9° and mainly less than 4°. Over these gentle slopes, but avoiding slopes of more than 9°, are to be found fairly extensive patches of deep, freely drained soils. In 1696 the bulk of the population was to be found on these deep-soil areas and the question arises as to their significance. Were they a factor in primary settlement location, or were they produced by the settlement itself? In the latter case there are precedents recorded further north in Buchan : "In good marble and claye soils they used to mix their Cattle dung with marish earth or scroof of useless ground and letting them rot a year together, put them to the land in the beginning of Winter and will reap after this the fifth or sixth corn, ordinarily they used to put at most seven hundred cartfuls to the acre of land." [6] It is possible, therefore, that some artificial deepening of the soil has taken place by long-continued improvement of the infield areas. Since, however, most of the deep soils lie on the south-east slopes of undulations, the leeside in relation to the last direction of ice movement in the north east, it is probable that a combination of factors must be induced to explain the relationship. Dr. Glentworth has reviewed the factors of soil development in the Insch area, and has come to the conclusion that the chief factors were original differences in deposition—*e.g.*, crag and tail effect, biological aspects—*e.g.*, more luxuriant plant growth in pre-cultural times on south-facing slopes—and human improvement.[7] In this particular district of Aberdeenshire at least, the distribution of settlements in 1696 may therefore be related to deep soil areas, and within the lowland itself the greatest density is to be found in an irregular belt, running roughly north-south along the right bank of the Urie, with an eastward downstream extension along the Urie Basin. Another

area of high density at this period was a belt to the north-east of Old Meldrum. Reference to the modern population distribution shows that this concentration on the fertile Garioch Lowland has continued to the present day.

Elsewhere the highest densities on the Buchan Platform may be related to good exposure, gentle slopes, and the proximity of the sea which gave a welcome addition to food supply. The coastal lowland between Rosehearty and Fraserburgh on the northern slope of the mainly inhospitable plateau has wide deposits of alluvium, and the soils developed on the schists are warmer than those on the granites and quartzites to the south and east. Another favoured area in the middle basin of the Ugie was mainly valley slope development, avoiding the flood plain and the waste lands of the interfluves. Near Aberdeen the lower reaches of the Dee and Don were both well populated, in both cases linked with the sale of agricultural products and peat to the citizens of Aberdeen. The early development of high concentrations of population on the south-facing fluvio-glacial terraces of the Dee near Peterculter is well marked and a forerunner of the modern high-class residential development. Further west, in the shadow of the western uplands, the alluvial basin of Monymusk was another well-populated district, associated probably with environmental conditions and the beneficial lairdship of the Grants.

The distribution of areas of medium population density is of wider extent and more continuous. The best example is the coastal development from Fraserburgh to Aberdeen and an offshoot following faithfully the valley of the Ythan, though concentrated on the south side for the most part. Elsewhere densities of 50-100 per square mile show a marked correlation with basins or valleys : the gneissic basin of Lumphanan let into the granite complex of the Hill of Fare and its western extensions, and further west on Deeside, the south-facing slopes of the hills which fringe the Howe of Cromar, the granary of the Earldom of Mar. To the north west was another well-populated zone, the northern part of the downfaulted Old Red Sandstone basin of Strathbogie, for long a part of the important routeway between the Mearns and the Lowlands of Moray.

In contrast, the interior of Buchan and especially the interfluvial areas were sparsely inhabited, indeed quite extensive areas were virtually unpopulated. The peaty moorland in the north had to wait a hundred years to be colonised and still remains one of the sparsely populated areas of Aberdeenshire. These were the tracts which suffered most in the recurrence of food shortage and famine which ensued in the eighteenth century. Later these tracts, with low population density in 1696, were the scene of intense agricultural activity as new settlements arose, both crofts and planned villages, in the efforts made to reclaim and colonise the poorer quality parts of the Lowland.

On the Buchan Lowland reclamation was not hindered by steep slopes and high moorland as it was in the Western Uplands. In the south west the platform ends abruptly against the next higher plateau, maturely dissected into a box-shaped area of heather-covered hills

surrounding an extensive basin drained by the Don. The summit levels of these hills, developed on resistant granite and metamorphic rocks, range from about 1400 to 1700 feet, and include the Correen Hills—Bennachie range in the north, Cairnwilliam and Hill of Fare in the east, and a range of hills including Pressendye (2032 feet) in the south. On the outer and inner slopes of these uplands settlement was limited by steep slopes and altitudinal limits seem to have been much the same as now, averaging about 800 to 900 feet. The central basin, the fertile alluvial Haugh of Alford, had the greatest population with 50-100 per square mile, decreasing towards the south west and north with greater altitudes, more undulating country and less fertility. The uplands themselves, though seasonally visited for peats and grazing, had no permanent population.

A narrow belt of hills, about 1500 feet high, connects the Western Uplands to the Highlands proper, the high plateaux of the Grampians and their eastward extension to the sea between Aberdeen and Stonehaven. Rounded and smoothed by glaciation, dissected by corrie formation and the deep glaciated troughs of the Dee and Don, the Highlands have many factors limiting settlement, of which altitude and steep rocky slopes are fundamental. The population belts, though not continuous, naturally follow the belts of lowland interdigitated with the highland, and the settlement sites are related to two main features : the kame terraces which frequently flank the lower slopes of the valley sides, and the alluvial fans which mark the entry of tributary glens into the main valleys. Both of these are intermediate between the steep rocky slopes and the floodable river plains. On one of these fans, at the junction of Glen Clunie, a routeway to the south, and the Dee, was the greatest concentration within the Highland plateaux at Castleton of Braemar. In fact both the Dee and Don with their tributary glens had comparatively high densities, with 50-100 per square mile in Glen Ey, Glen Clunie and Glen Gairn, and 100-200 per square mile in the immediate vicinity of Braemar. As a result of extensive depopulation in the next two hundred and fifty years, these Highland glens now have derelict crofts and small patches of reclaimed land to show where people once lived and worked. Probably one of the highest areas of settlement in Aberdeenshire was in the downfaulted Old Red Sandstone basin of the Upper Cabrach. Here, a few people took advantage of the gently sloping but peaty depression to gain a frugal living in a poor climate and harsh environment, by raising some cattle and stealing others from the Lowlands.

From the demographic record given by the Poll Book and a comparison with later records two fundamental points emerge. The geographic factors of slope, climate, vegetation and soils change in their relative values as new techniques are discovered and colonisation of less fertile and less attractive areas can proceed. Nevertheless, regions intrinsically fertile have been long settled by a stable population, and it is on the marginal lands that the greatest fluctuations of an agricultural population occur. Secondly, the continuity of settlement brings to the present day threads and patterns of the past geography of a region, which blend with the mosaic of later changes and the current geographical pattern.

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SCOTTISH COAL

By Robert A. Moore

In view of the fundamental changes which have recently been made in the organisation of the coal industry, a discussion[1] on Scottish coal-mining would seem most appropriate at this time.

Under the Coal Industry Nationalisation Act, the National Coal Board had to take over 800 undertakings in Great Britain which had controlled some 1400 collieries. The National Coal Board divided Great Britain into eight Divisions, each under the control of a Divisional Board.

In Scotland, on 1st January 1947, the Divisional Board took control of 269 collieries which had formerly been operated by over 120 Companies. A number of these were small surface mines—employing 10, 20, or 30 men—which were engaged in extracting pockets of coal which lay near the surface and which could not be developed to any degree. Their reserves were limited in most cases, but as they were making a useful contribution to the Scottish output, their future operation was permitted under the Nationalisation Act. While their mines and plant became the property of the N.C.B., approximately 70 undertakings in Scotland were given licences to continue their operations, leaving 194 collieries to be run by the Scottish Divisional Coal Board. At the present time, after almost three years of nationalisation, there are 190 N.C.B. Collieries in Scotland and 57 Licensed Mines.

The Origin of Scottish Mining

The earliest record of coal-mining in Scotland is found in a Charter granted in A.D. 1210 by Seyer de Quinci to the Monks of Newbattle, whereby the latter were given the right to the "coal heugh and stone quarry in the lands of Pinkie and Inveresk." The Monks carried on a primitive form of mining in which they quarried the coal along its outcrop until they were unable to deal with the water—they then

moved to a new spot and opened up another quarry. In 1526 the Monks of Newbattle were given by King James V the power to construct a harbour at Prestongrange, and it was at this, and other early harbours, that the foundations of the export coal trade of Scotland were laid.

Another historical note of about the same period seems to be fairly topical. After the battle of Pinkie in 1547, rather than fall into the hands of the victorious English, many of the inhabitants of Tranent took refuge in nearby underground workings. As they were unable to dislodge them the English troops were said to have stopped up the air holes which had been sunk at intervals to provide fresh air. They then proceeded to light fires at the entrances to the mines so that the Scots had either to suffocate or surrender. It is interesting to note that, in a number of instances, air-raid shelters were constructed in shallow mines during the recent war, some 400 years after the Scots had set the example at Pinkie.

The development of steam allowed the working of coal to take place from depths hitherto thought impossible, and this new form of power was used for both pumping and coal winding towards the end of the eighteenth century. Previously the greater part of the coal had been carried up spiral stairs or ladders in baskets by women or children. It has been estimated that an average day's work done by one of these women was equal to carrying one hundredweight from sea level to the top of Ben Lomond. However, the underground employment of all women and of boys under 10 years of age was forbidden as a result of a Parliamentary Commission which examined the Mid and East Lothian conditions in 1840, and from 1842 onwards women have been employed only on the surface at collieries. Their employment is gradually being discontinued altogether.

The Growth of Coal Production

Great developments began in the nineteenth century in the Lanarkshire coalfield, where the exploitation of the Blackband ironstone, which was found in conjunction with seams of coal, started the success of the steel-making industry, and led ultimately to the growth of the many Clyde shipyards. Many new collieries were opened up in Lanarkshire and Ayrshire in the latter half of the century, and at this period the centre of importance of the Scottish coal industry definitely moved from the East of Scotland to the West.

Almost one hundred years ago, in 1854, the annual Scottish output was nearly $7\frac{1}{2}$ million tons which was produced from 367 collieries; ten years later the corresponding figures had increased to $12\frac{1}{2}$ million tons from 497 collieries. The increasing trend in output continued until at the beginning of the present century an annual tonnage of over 33 million tons was produced. The peak of Scottish production was reached in 1913 when a total of 42,456,516 tons of coal was raised.

It may be of interest to mention the districts which were responsible for coal production in 1910. The major portion of the coal came

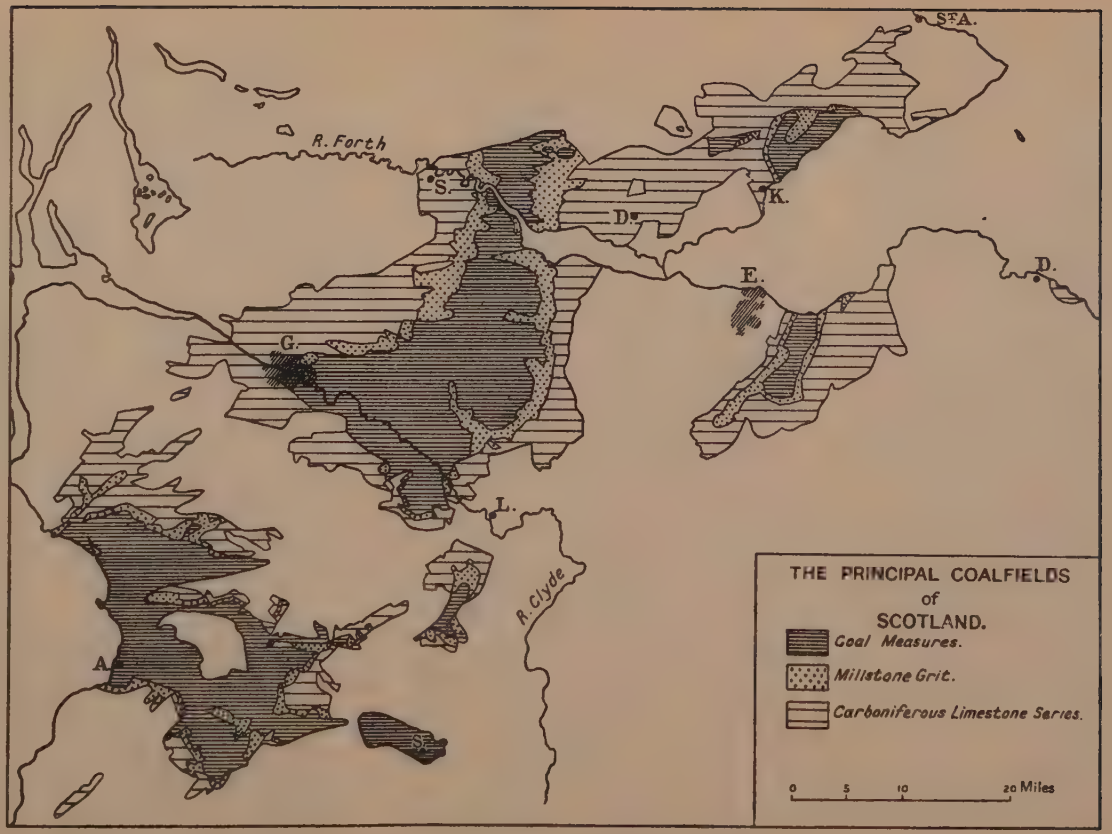

Fig. 1. The principal coalfields of Scotland.

Based upon the Ordnance Survey map, with the sanction of the Controller of H.M. Stationery Office.

from the Central Coalfield in the counties of Lanark, Dunbarton, Renfrew, Stirling and West Lothian. Out of a total Scottish production in 1910, of 41,335,132 tons, the Central group was responsible for 23,712,489. The remainder of the tonnage came from Fife and Clackmannan, 9,080,316 ; Ayrshire and Dumfries, 4,462,152 ; and Mid and East Lothian, 4,080,175.

Twenty years later, in 1930, the total Scottish production had dropped by almost 10 million tons to 31,658,700, mostly accounted for by a fall in production in the Central coalfield of 8½ million tons.

Coal Output during the Second World War

The position remained more or less static during the 'thirties, with the Central coalfield still on a decreasing trend. With the outbreak of war in 1939 began a period of considerable difficulty in all the Scottish coalfields. Man-power was scarce, materials and machinery were in short supply, and the Lanarkshire coalfield, from which so many millions of rich coal seams had been won, was at last showing signs of exhaustion. The thicker seams were almost worked out, and seams down to two feet in thickness—and sometimes considerably less —were being opened up to replace them. This brought about a substantial increase in working costs at many collieries, and in order to encourage Colliery Companies to continue uneconomic pits in production, a system of subsidising these losing concerns was introduced by the Government.

Planning the Scottish Coal Trade of the Future

It was apparent, however, that drastic steps would have to be taken to replace the diminishing Lanarkshire output, and very valuable information was gathered by the Scottish Coalfields Committee, a body set up by the Secretary of State for Scotland, in July 1942. This Committee was composed of representatives of all sections of the Coal Industry, and they gave a reasoned appreciation of the position as it was in 1943 and estimates of the possible trend of output in the future. A summary of the possible individual outputs (in millions of tons) of each district was given by the Committee as follows :

	CENTRAL COALFIELD		FIFE AND CLACKMANNAN		LOTHIANS		AYRSHIRE AND DUMFRIES		
Year	Output	% of Scot. Output	Output	% of Scot. Output	Output	% of Scot. Output	Output	% of Scot. Output	Total
1939	13·50	42·6	8·2	26·9	4·05	15·1	4·73	15·4	30·48
1965	10·25	29·9	11·73	34·2	6·80	19·9	5·50	16·0	34·28
1975	8·44	25·8	12·0	36·7	6·80	20·7	5·50	16·8	32·74

It will be seen that the Committee envisaged a continuance of the reduction of output in the Central district, and they budgeted on a corresponding increase in the other three districts, chiefly in Fife and Clackmannan.

It was fortunate from the Scottish viewpoint that the reserves of coal remaining in the East of Scotland were extremely large, and that many thick seams of coal still remained to be developed. In 1943 the Committee estimated that the available reserves in Fife and Clackmannan amounted to the huge total of 924 million tons with a possible additional tonnage of 3 billion tons. The corresponding figures for the Mid and East Lothian fields showed a total probable reserve

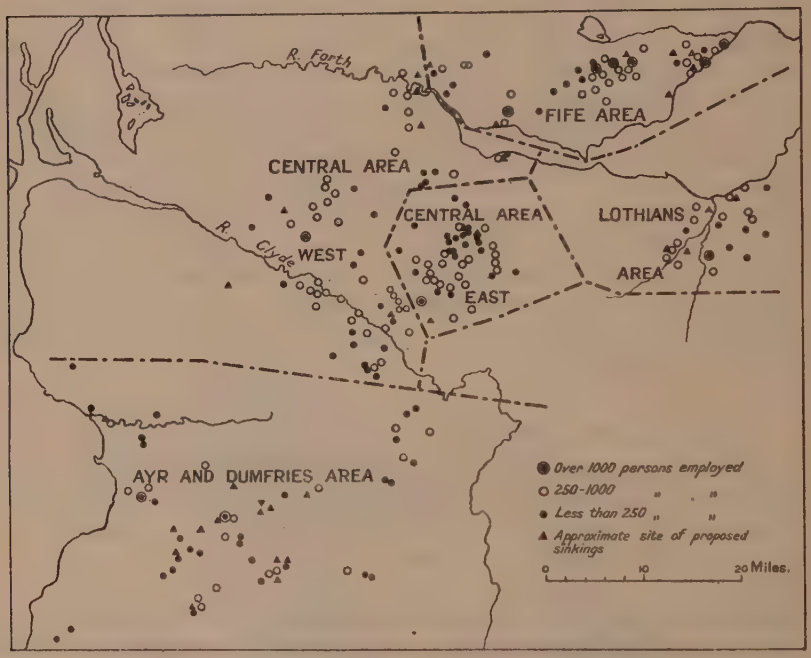

Fig. 2. Midland Valley of Scotland. Coal mines and National Coal Board Areas.

tonnage of almost 1¼ billion tons. Both in the case of Fife and Lothians the reserves of coal have only taken in a distance amounting to about three miles from each shore of the Firth of Forth, and vast tonnages may safely be added to the above figures as it is possible that these two coalfields can be assumed to be joined under the Firth.

The Ayrshire reserves were estimated at this time to be over 1 billion tons and the remaining reserves in the Central district to be 900 million tons. Much of this tonnage, however, is represented by seams of two feet or less, and it is doubtful if they can be worked economically.

A most comprehensive study of the Scottish coalfields was made by Mr. P. R. Crowe, B.Sc., some twenty years ago,[2] and it is interesting to note that in the figures given by him, a total of 11,700,000 tons

was shipped from Scottish ports in 1927, out of a total annual output of 34,540,000 tons. At this time, Mr. Crowe also pointed out that there was a tendency for the centre of the coal trade to swing from the west to the east of Scotland, a process which, as indicated in the present paper, has rapidly gained momentum.

The Housing of the Miners

The Coalfields Committee recognised that one of the main problems to be faced when changing the centre of Scottish mining from West to East would be the supply of miners in the required numbers in the developing areas. They estimated that some 14,000 new houses would be required for new sinkings, together with an additional 11,000 houses at existing collieries where an increased output could be obtained if extra men were available.

During the war, the Ministry of Fuel and Power followed up the proposals put forward by the Scottish Coalfields Committee, and eventually arrangements were made with the Department of Health that houses would be built in the developing areas specially to house the miners and their families transferring from Lanarkshire. A certain amount of building was started even during the war towards fulfilling this programme, and the foresight in providing, even in a small degree, houses to meet this problem is now proving most valuable.

Nationalisation and Organisation of the Coal Industry

When the National Coal Board took control of the industry on 1st January 1947 they were faced with many problems. In Scotland, due to the war difficulties, output had dropped to a most serious degree, and the 1946 annual tonnage had reached just over 22½ million tons.

The Scottish coalfield was divided by the Coal Board into five Areas more or less corresponding to the old geographical divisions, with the Central district split into two Areas—Central East and Central West. These divisions were decided more according to geological than to geographical boundaries, and in some cases counties were amalgamated to form an Area, and in others, counties were split, part falling into one Area and part into another. The final division was as follows :

(1) Fife and Clackmannan formed an Area under that name, bringing in the one colliery in Perthshire, at Dollar.
(2) Lothians Area consisted of two of the three Lothian Counties, namely, Mid and East Lothian.
(3) Central West Area included the counties of Stirling, Dunbarton, and Argyll, together with the western part of Lanarkshire.
(4) Central East Area took in West Lothian county and the eastern part of Lanarkshire.

(5) Ayr and Dumfries Area included Ayrshire and Dumfriesshire, together with the southern part of Lanarkshire, *i.e.* around Douglas.

The unit of general management was made, as far as possible, an Area, and each Area was further subdivided into two or three Sub-Areas—there being a total of 13 Sub-Areas in Scotland. The chain of control passed from the Sub-Area Production Managers to Colliery Agents, who had charge of 4 or 5 collieries, each under the direct management of a Colliery Manager.

Operational Problems

This new organisation was faced with the task of carrying on the operation of over 190 collieries which had not been given Licences, and the various ancillary activities which had vested in the N.C.B. In Scotland these included 22 brickworks, 4 coke oven installations, 5 briquetting plants, 3 gas works, 8 farms, 21,000 houses, and almost 50,000 acres of land, so that there was no lack of variety.

Mistakes were made, as was bound to happen, but each year has shown an increase in output as compared with the previous one since the Coal Board took control. Planning Departments, which were only operated by the larger and more progressive Companies under private enterprise, have been developed in each Area and Sub-Area, and a closer contact is being maintained with the County and other Planning Authorities. By this means the future requirements of the coal industry are being kept in line with the general development of Scotland.

This is well exemplified in the new town of Glenrothes, in Fife, which is being built largely to provide housing for the miners required for the new Rothes Colliery and other developments in East Fife. The whole township is being planned to maintain a balanced population as it is felt that this is preferable to having a wholly mining community. Advantages of a mixed community are that there are local industries where the miners' daughters can find work and also that, should times of depression come in certain industries, the whole population is not affected.

A further advantage of the closer collaboration between N.C.B. and County Planning staffs is that sites can be chosen as far as possible to minimise the effects of subsidence due to coal operations. As the coalfield extends, it is becoming more and more difficult to find land entirely free from possible subsidence, and considerable research is going on to minimise the effect of this. This may be done by improved design of houses with an additional supporting structure, or alternatively the effect of the coal working on the surface may be reduced by some form of mechanical packing underground. The latter method is so far only partially effective, and can only be applied under very special circumstances. It involves the use of a considerable number of extra men, with a corresponding increase in the cost of coal.

COMRIE COLLIERY, FIFE

MODEL OF ROTHES COLLIERY, FIFE

← 3½ TON CAPACITY MINE CARS BEING EMPTIED AT PIT BOTTOM

COMRIE

MAVOR & COULSON SAMSON STRIPPER AT WORK UNDERGROUND, LOADING COAL ON TO A CHAIN CONVEYOR →

Experiments are, however, still proceeding, as it is essential that the scenes of destruction which can be seen in some of the older mining districts must be avoided wherever possible. If some more efficient method of disposing of the debris underground can be found, it may have the result of reducing the man-made monuments which are at present common in mining areas.

The Colliery of the Future

The colliery of the future is certain to be far more pleasing in appearance than the traditional coal mine. Comrie Colliery in Fife (see photographs), which was planned and completed under private enterprise, set a standard which many other parts of Britain have endeavoured to adopt for their new sinkings. Rothes Colliery, which is now being sunk, has been planned with at least an equal regard to the question of appearance, and in the latter case a feature will be that no pulley wheels will be visible on the pithead frame, as these will be enclosed in two towers 200 feet high. This will be achieved by building the winding engines directly above the shafts, a method which has been adopted on the Continent in a number of cases.

The colliery of the future will in the main be capable of producing much larger outputs than was common in the past, *e.g.* Rothes should produce 5000 tons of coal per day. While there are obvious advantages to be got from such concentration of output, there are equally some drawbacks. The capital cost of laying out such a large colliery is very high, as all the plant and equipment must be of ample capacity. It has been decided, *e.g.* at Rothes, to sink the shafts of 24-feet finished diameter, and as these have to go down to a vertical depth of 1000 yards, the outlay in this alone is more than would have equipped one of the collieries of previous years. The time taken from the date when the first sod is cut on the surface until the colliery is in full production is also greatly extended—while Rothes was started in 1946, it is not thought that it will be up to full capacity until 1960. Output should start to come in 1956, and build up each year.

As a short-term policy, in order to give the country some badly needed coal until the new collieries came into production, the Scottish Divisional Board planned a series of surface drift mines throughout the country. These mines were designed to take out shallow coals which had been left in a number of districts, and the latest methods in haulage and working the coal were brought over from America. Self-discharging mine cars of 2-tons capacity were used, and outputs of 300 or 400 tons were drawn each day at very high efficiency. Over thirty of these mines have been planned in Scotland, and they have helped materially to bridge the gap.

Another means of getting additional coal quickly which has been tried is by opencast mining. This is the process whereby coal is quarried from the surface by huge diggers, the covering earth having previously been removed. Its application is very limited in Scotland.

Future Winning of the Coal

In the mine of the future, all mechanical means possible will be used to enable the man-power to be utilised efficiently. A number of machines have already been designed to load the coal mechanically on to conveyors without men having to use energy shovelling. Some of the best known have Scottish connections, *e.g.* the Anderson Boyes Meco Moore Cutter Loader, the Mavor & Coulson Wedge, and the Logan Slabber. These machines have, however, considerable limitations and there are definite gradients and thicknesses beyond which they cannot be used. Where possible a machine will be used to load the coal on to conveyors which will deliver it into large mine cars each holding several tons of coal. Long trains of these cars will be taken at high speeds by diesel or electric locomotives to the pit bottom, where the coal will be wound to the surface. In some of the large shafts, four separate cages will be running simultaneously in each shaft. On arrival at the surface, the coal will be taken to preparation plants where more and more it is aimed to cut out the human element and ensure, by the use of mechanical cleaning devices for all the coal, that the product put on to the market is as free from dirt as possible.

In all probability the coal will eventually be taken from the collieries to the markets in very much larger wagons. In America, wagons of up to 100-tons capacity are used, and while this may not be possible on British Railway lines, there is no doubt that there will be a considerable increase in the average size used.

As stated earlier, the colliery surface will be planned equally for efficiency and appearance. Fully qualified architects are now employed in the Scottish Division of the N.C.B. and they are collaborating with the technicians from the beginning of every new colliery project. At most of the collieries of the future, electricity will be employed for all surface operations, and the smoking chimney will also be done away with.

Migration of the Miners

All the technical skill available, however, will be of little avail unless the man-power is present in the right places and numbers, and unless that labour force is prepared to co-operate fully in producing coal at the maximum efficiency.

Mention has been made of the transfer scheme whereby the men will move from the worked-out Lanarkshire collieries to Fife and the Lothians. It should, according to present figures, be possible to absorb in these developing areas all the redundant Lanarkshire miners, but this is dependent on getting the new collieries sunk and the additional houses built within the required time.

It also depends on the attitude taken up by the men concerned, as it is fully realised that the migration problems may have far more of a human background than a purely mechanical one. The miner

may have several sons and daughters employed locally and be unwilling to uproot himself and move to new mining development areas —in some cases possibly leaving some of his family behind. He may also be influenced by the prospect of leaving his local community interests and may prefer to remain in his former home, even after the colliery has been closed, in the hope of finding alternative work in some other industry.

These objections are being met as far as possible by the policy of building balanced communities and also by encouraging the younger men with fewer family ties to migrate, leaving the older men to finish off their working days in those Lanarkshire collieries which may still be in production. This policy has already given very encouraging results and the developing areas have already got a number of most valuable transfers.

The importance of recruitment of youths to the mines is fully realised and every effort is being made to attract suitable boys to take up mining as a career. Any boy who shows aptitude is encouraged to take up mining studies by allowing him either part-time or full-time release to attend classes, and it is certain that, with the technical advances being made in colliery operation, there will be some excellent opportunities in mining management in the future.

Other Factors affected by Coal

Man-power is being conserved by special research into accident prevention, and that some progress has been made is shown by the fact that the number of deaths per 1000 persons underground has decreased from 4·9 in 1850-60 to 1·6 in 1900 and 1·2 in 1938. It is pleasing to record that the general trend in recent years has shown continued improvement, and the fatal accident rate in 1948 was the lowest on record.

There are many other aspects which could be covered in a discussion such as this—several suggest themselves. For example, in view of the increasing production of coal in the East of Scotland, what is to be the position of the iron and steel industry? Some have expressed the view that this industry may follow the coal and move to the East, but two factors may outweigh the advantages of saving transport costs on coal.

The first is nearness to the shipbuilding yards on the Clyde and the engineering works in the West of Scotland, and the second is the fact that little high-quality coking coal is likely to be found in either Fife or the Lothians. At present the coking coal comes from Stirlingshire and around Bathgate, and reserves in both these areas are fairly substantial. The position in twenty or thirty years may require review, as several sources of supply of coking coal in the Central district will then be cut off.

A second interesting angle is the future of coal exports. Previous to the war there was a steady tonnage of approximately five million tons shipped as export cargo from Scottish ports, with an additional

two million tons shipped as export bunkers. This was divided approximately in the ratio of 3 to 1 for export cargo tonnage in favour of the East Coast ports; the tonnages shipped as export bunkers being approximately equal.

During the war exporting of coal was practically stopped, but during 1948 a total of 1,300,000 tons was shipped as export cargo from all Scottish ports, 900,000 tons going from East Coast ports and 388,000 tons from the West Coast. With the big increase in tonnage planned for Fife and Clackmannan and the Lothians, it is likely that exporting of coal will again provide a valuable source of revenue for Scotland, and it is probable that the ratio of 3 to 1 in favour of the East country ports will increase substantially in the future. This, of course, depends on our ability to produce the coal in quality and at a price which can compete with coal produced on the Continent. The present practice in Britain is to charge some 20s. in advance of home prices on coals shipped abroad, but this may require to be reviewed as foreign competition becomes keener.

The future of the Scottish coal trade is, as will be seen, very much in the planning stage at present. It is planned to adopt new methods wherever possible, to use mechanisation in increasing quantities, and to ensure that the labour force will be adequate and will be intelligently and efficiently utilised. With so much of Scotland's prosperity directly and indirectly dependent on coal it is imperative that these objectives should be realised as soon as possible.

[1] The Discussion, led by Mr. R. A. Moore, O.B.E., Deputy Production Director of the National Coal Board, Scottish Division, was held in the Society's Rooms on 18th November 1949.

[2] Crowe, P. R. The Scottish Coalfields. *S.G.M.*, 1929, 45 (*6*) : 321-337. 6 figs.

TREE RINGS AND SUMMER TEMPERATURES

A.D. 1501-1930

By D. Justin Schove

Tree-ring analysis can be applied either to dendrochronology or to historical meteorology. Dendrochronology or dating by tree-ring patterns involves three initial limitations : (*a*) Only *one species* should be considered at one time. (*b*) The trees should be from one *climatically uniform* area. (*c*) The measurements of growth for each year should be *corrected for age* by a single objective method.

The first restriction is necessary because each species has its own peculiar ecology ; each type, for instance, has its own characteristic reactions to insect pests. As an example, the Scandinavia pine and spruce curves to be used in this research differ considerably from one another, and it is not therefore possible to date the pine-timbers from an old Norwegian house by a chronology based on the patterns of spruce trees.

The second principle is not so cramping in North America [1] where the geography is relatively simple. In Scandinavia, however, the rainfall and snowfall regimes vary considerably from place to place, and it is often difficult to cross-date pines from near one fiord with those from a neighbouring valley. A similar restriction will be necessary in Scotland, where eastern and western trees will probably show quite different patterns.

The final restriction is necessary because trees grow more quickly when they are young ; for a series of growth-values to be useful meteorologically, they should be based on trees of different ages and corrected according to the average growth of the trees in question. Some methods of correction are satisfactory for cross-dating but introduce a bias in favour of either the older or younger trees.

Historical meteorology cannot commence until standardised corrected tree-ring series have previously been prepared in accordance with these limiting conditions. However, a single series is insufficient, and the correlations, by the late Professor Huntingdon, between the 2000-year Sequoia curve of California and the weather in either the Mediterranean or the U.S.A. are now regarded with justifiable suspicion. On the other hand, when several series have been obtained the three restrictions are not only unnecessary ; they must actually be ignored. The present investigation uses therefore five series (*a*) for *different* trees, (*b*) from *different* parts of Northern Scandinavia, and (*c*) corrected for age by *different* methods.

The five series used, in order of publication date, are as follows :

Swedish Lapland : Kuovhonvuopio, $68\frac{1}{4}^\circ$ N $19\frac{1}{2}^\circ$ E. *Pinus silvestris* subspecies *lapponica*. (Erlandsson, 1936.)[2]

Swedish Lapland : Nokutusvaara, 68° N 20° E. A similar pine series in a neighbouring situation and from the same work.[3] At present this series does not begin until 1578, and the first series has therefore been duplicated to fill temporarily the place of the missing earlier values. This series itself was based on only one tree to 1682 and the indices of Ording and Eidem that follow are far more reliable.

North Norway : Steigen-Sørfold, 67½° N, 16° E. Another *Pinus silvestris* series, the Standard Scale I, from Ording,[4] which actually extends (Tab. 33a, p. 305) back to 1396. The number of trees varies from 8 to 52.

NW Norway : Selbu, near Trondheim, 63° N 11° E. A spruce (*Picea abies*) series from Eidem (1943).[5] Three trees of this group extend back into the fifteenth century.

NW Norway : Østbyhaug i Tydal, also near Trondheim, 63° N 11° E. A spruce series based on various old building timbers which have been carefully cross-dated with the Hilmo curve in the Selbu group by Eidem (1944a).[6] The data extend only to 1862, but for subsequent years the neighbouring Trondheim Bymark spruce series from Eidem (1944b),[7] based on 13 newly-felled trees, has been used.

Fig. 1 represents the mean growth of the five series. These five series, when plotted graphically, did not look very similar, and they did not readily cross-date with one another. However, as Hustich [8, 9] has shown, various trees near the arctic circle depend on the temperature of the growing season.

The temperature anomaly of a particular growing season is usually similar over a wide area extending at least from northern Scotland to Finland. It can be correlated with the pressure difference between Finland and East Iceland, or more generally with the extent and the strength of the summer monsoon. At this time the northerly winds of this little-known " summer monsoon " normally affect West Russia, but they spread to Scandinavia particularly in June ; occasionally they extend as far as the British Isles to give a week of cloudy weather usually attributed to a " Buchan cold period." No long temperature series exists for the extreme north, but the recently calculated series (Birkeland) [10] for Trondheim extends back to 1761 and from this the mean temperatures for May-August have been extracted for Fig. 2.

Fig. 1, representing the mean growth of the five tree-series, was intended originally as a preliminary index. However, the relationship between the tree and temperature indices was found to be so close as to warrant publication of the tree figures as they stand. In any case it would have been difficult to assess the weight to be attached to each of the five series.

The data of Figs. 1 and 2 if plotted against one another lead to the following formula connecting tree-growth and temperature in any particular summer :

$$t \pm 6 = 9\tfrac{1}{2}d - 82\tfrac{1}{2}$$

where t=temperature anomaly from May to August at Trondheim (°C×10)

d=mean tree-growth in the five areas (mm×10).

and the probable error is also only 0·6° C in comparison with the interquartile range of the temperatures—among themselves—of 1·7° C.

Tree-growth in individual years varied from over 1·5 mm in the warm summer 1828 to less than 0·6 mm in the cold summer 1821. The ten summers in which tree-growth was greater than 1·15 mm were warm and except for 1829 and 1861 were actually not less than 2° C above the 1901-30 normal. The nine summers in which tree-growth was less than 0·7 mm were invariably cold.

If the periods 1761-1850 and 1851-1930 are considered separately, the same formula and the same probable error are still applicable,

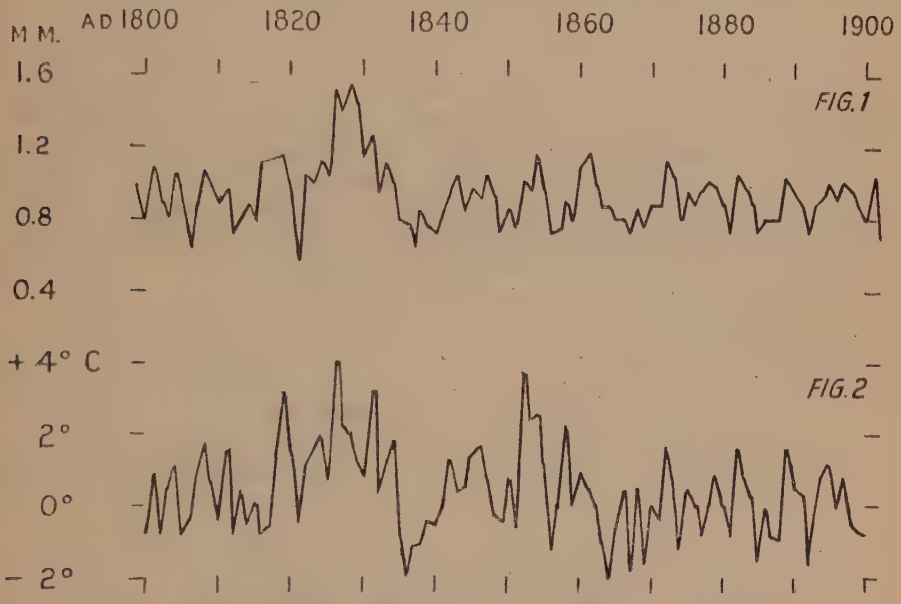

Fig. 1. Mean growth, 1800-1900, of five tree-series from Swedish Lapland and N and NW Norway.

Fig. 2. Mean temperature anomaly of growing season (May-August), Trondheim. From data by Birkeland (1949).

so that it is reasonable to assume that the tree rings give an indication of summer temperature not only after 1760 but also before temperature records began. The index for the year 1504 may perhaps be based on an insufficient number of trees, but the following summers (growth 1·15 mm) would appear to have been warm: 1581, 1606, 1657-60 inclusive, 1684 and 1685, 1690 to 1694 inclusive, and 1703. Little information is at present available to check these claims except that famines caused by drought are known to have occurred in Finland in 1685 and 1692. On the other hand 1547, 1591, 1597, 1599, 1614, 1620, 1645, 1680, 1734, 1741 and 1744 would appear to have been cold summers in North Scandinavia inasmuch as the growth in these years was less than 0·7 mm.

It is usually stated, following A. E. Douglass, that the sunspot cycle can be found in trees and photographs of a N German pine showing a wide ring every eleventh year are often reproduced [10a] as evidence of this. Nevertheless the tree-ring indices of Fig. 1 if tested for the sunspot cycle by the methods outlined in previous papers (Schove) [11, 12] show that there is no significant relationship.

The relationship between tree-growth and temperature applies not only to individual years but also to groups of years. The formula for five-year periods is very similar, but the probable error is halved and is only 0·3° C in comparison with an interquartile range of 1·0° C. The formula is :

$$t \pm 3 = 9\tfrac{3}{4}d - 85.$$

Once again, if the first and second halves of the record are considered separately, the formulae are very similar. From 1826 to 1930 both temperature and growth were abnormally high—the temperature exceeded the 1901-30 normal by 2° C and the tree-growth averaged 1·2 mm—more than is to be expected from the formula. Generally speaking both formulae indicate that a temperature anomaly of 1° C corresponds to a tree-growth anomaly of 0·1 mm.

The following clusters of cold and warm summers can be inferred from the tree-ring curve :

1547-1554	Cold	1635-1645	Cold
1563-1581	Warm	1657-1668	Warm
1587-1601	Cold	1684-1694	Warm
1604-1610	Warm	1710-1720	Cold
1614-1620	Cold	1733-1744	Cold

It is probable that the true temperature curve varies somewhat from this pattern. One group of three warm years (1768-70) is known in which tree-growth was actually slow. Nevertheless, the general validity can be tested by correlation with tree-ring averages in Alaska, Iceland, and northern Scotland.

Many attempts have been made to correlate tree-rings in distant areas, but they have invariably proved unsuccessful—primarily because the correlations between the weather factors are also very small. Thus, a warm winter in North Scandinavia usually but not invariably synchronises with a cold winter in the Davis Strait. However, the *trend* of temperatures in high latitudes is independent of longitude, and, for example, a group of cold winters in northern Scandinavia will correspond approximately with an increased frequency of cold winters in, say, northern Canada or Siberia. Therefore, dendrochronological indices for other regions near the arctic circle may show little relationship for year-to-year curves, but when running 5-year or 30-year means are plotted the correlation should be significant.

The periods of rapid and slow tree-growth in northern Scandinavia, as indicated *e.g.* by 30-year means, are tabulated :

PERIOD	TREE GROWTH		INFERRED TEMPERATURE ANOMALY	LITTLE ICE AGE IN MID-EUROPE (Schove 1949)
-1581	Moderate	0·9 mm	0° C	Phase Ia. Warm summers. No glacial advance.
1582-1653	Slow	0·8 mm	−1° C	Phase Ib. Cool summers.
1655-1678	Moderate	1·0 mm	+1° C	Phase Ic. Hot summers.
1684-1703	Rapid	1·1 mm	+1½° C	' Interglacial ' in N Europe.
1708-1751	Very slow	0·8 mm	−1° C	Scandinavian post-glacial maximum (Phase II ?).
1751-1834	Fairly high	0·95 mm	+½° C	' Continental ' type.
1835-1928	Moderate	0·9 mm	0° C	Phase III. Winters becoming milder.
1928-1950	Rapid	?	+	Amelioration affects springs and summers.

It would be interesting to know whether these correspond to the periods of recession and advance of the Scandinavian glaciers, for it is known that temperature is the most important factor in glacial advance. However, little datable evidence on this subject is available at present.[13] A comparison with the phases of the Little Ice Age in Middle Europe (Schove) [14] is given but it shows only a vague correspondence ; however, a close relationship in different latitudes is not usual ; the subject needs further investigation and Scotland may supply the missing link.

Despite the increase of knowledge of forestry science,[15] dendrochronology has hitherto made but little progress in Scotland. The three limitations mentioned at the beginning of this paper have discouraged investigators. Thus :

(*a*) Pines and oaks have different patterns.
(*b*) West, east and north Scotland have different patterns even for the same tree-species.
(*c*) No standardised index numbers or master curves are available for Britain by which datings of timber from old buildings and archaeological sites can be mathematically tested.

The third obstacle can now be removed for at least the period A.D. 1501-1930. On the one hand Lowther's 2000-year chronology of oaks in SE England will soon (cf. Lowther, 1949) be available [16] ; Huber [17, 18] and others (1949) are preparing similar chronologies for Germany. These will be found applicable to archaeological timbers at least in East Scotland. On the other hand the data of Fig. 1 can provide a check on any tentative dating of building timber—for most Scottish trees are sensitive to summer temperature, and temperature anomalies in Scotland and North Scandinavia are usually similar, especially if five-year means are considered.

The result of this study shows that tree-ring chronologies can be used not only for dendrochronology but also in historical meteorology. The procedure is somewhat different, but it appears probable that in

this way a real teleconnection or correlation will be found between tree-patterns in Scandinavia, Scotland, and other parts of the world.

I should like to express my thanks to the various authors who have made this investigation possible by sending me useful advice and reprints listed below, also to D. H. Pickard for his help with the statistical work.

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ALASKA

Review by Isobel W. Hutchison

When allied bombers attacked Berlin in the night of 22nd-23rd November 1943, most of the Alaskan photographs which Professor Bartz had gathered for his projected book became a prey to the flames. After the war they were replaced by others from America, and the book [1] is now issued with numerous illustrations and maps, the first volume to be so embellished in the valuable series of *Geographische Handbücher*, published again in Germany since the war. This book on Alaska should be an important addition to European knowledge of the United States' still surprisingly little known or developed Territory. Though Alaska has not yet reached the position of Statehood, there are indications that, with its increased post-war white population, this event may yet be attained.

Alaska was purchased by the U.S.A. from Russia in 1867 for a little over seven million dollars, a sum which the development of the fisheries alone has since repaid—in the period 1867-1936—by more than a milliard of dollars. During the same period the development of the country's mineral wealth, principally gold and copper, produced between eight and nine million dollars. Professor Bartz has made a very careful and thorough study of this land which he visited for nine months in 1936 and 1938, during his four years' residence in America. During this time his book was planned, but the outbreak of war postponed its publication, and he has now been able to incorporate much post-war information on the region, which became a great strategic base in the front line of war when the Japanese in 1942 suddenly occupied its outposts on the Aleutian islands of Attu and Kiska, and planned its very narrowly averted invasion.

The book, which is very thoroughly documented by references to no less than 214 publications, is divided into sections upon the nature and climate of the country, with its surprising contrasts between heat and cold ; the aboriginal inhabitants ; the development of Alaska by the Russians and Americans since its discovery by Vitus Bering in 1741 ; the economic life of present-day Alaska, with detailed investigation into its fisheries, wild life, gold mining, farming, forestry and fur production, and upon the human population and settlements in present-day Alaska.

It is in this last section that the author reaches some of his most interesting conclusions. The pressing need of present-day Alaska, with a population in 1940 of only 72,524 inhabitants, or about one to every ten square miles, is for more settlers. The white population tends to be a very seasonal and fluctuating one : many of those who make good money in summer at the fisheries and mines, go ' outside ' in winter to spend it elsewhere. Europeans, especially Finns and Scandinavians, would in Professor Bartz's opinion make the most desirable settlers. He holds that the United States citizen of to-day has now too high a standard of living to make him a good pioneer as he was in the days of the ' covered waggon.' The present population

of Alaska is gathered irregularly in the coastal settlements or along the chief waterways of the Yukon and other rivers, for water is the most important means of transport in a land still largely without roads or railways. It is true that the introduction of the airplane about 1930 revolutionised the lives of residents, but planes are unsuitable for heavy transport and freight charges are still very high. This applies also to ships, for Alaska is to-day one of the dearest countries in the world to live in.

Alaska's present white population is largely cosmopolitan. Some of the gold-diggers remained as settlers after the gold fever abated fifty years ago, when the little village of Nome on the Bering Sea became in 1900—almost overnight—a tent-city of thousands of inhabitants, owing to the discovery of rich deposits of gold on its beaches and in the surrounding country. Salmon-canning has also brought its quota of residents and is now the major industry of Alaska, which exports 65 per cent. of the world's canned salmon. In 1936 there were 117 salmon canneries between Bristol Bay and Ketchikan at the southern end of the Alaskan 'pan-handle.'

The inhospitable geographical nature of the country, with a soil much of which is permanently frozen to within a foot or two of the surface and 3 per cent. of which is under perpetual ice and snow, the great mountain ranges which cut off the coastal towns in the Gulf of Alaska from the interior, the government's policy during the first part of the century of conservation of resources, the lack of transport and the high freight charges which still make it cheaper to bring goods in by steamer instead of by the new Alaska Highway, the upkeep of which is reckoned to cost to-day about 600 dollars per mile, are amongst the causes which prevent settlers taking up permanent residence in Alaska. Such drawbacks have frustrated many would-be farmers in the more fertile regions of Matanuska, the Kenai Peninsula and elsewhere. Amongst the settlers who have remained it is interesting to note a small group of Scots brought to Dutch Harbor in 1917 to teach the natives there how to cure herring in the Scottish manner, one or two of whom were still resident in 1936.

Though most of the few Aleut inhabitants of the Aleutian and Pribylov Islands were evacuated before the Japanese invasion, Professor Bartz is mistaken in supposing (p. 335) that the community on Attu escaped and were repatriated after the war. Of the 44 natives taken prisoner from Attu by the Japanese only 22 survived their hard treatment and semi-starvation at clay-mines in Japan, and these have been now re-established on Atka, nearer the American base at Dutch Harbor. Attu is now uninhabited, and its native village was destroyed in the war, which has reduced by half this very interesting native remnant, whose origins Professor Bartz regards as still much of an unsolved mystery. The latest post-war excavations made by American scientists in 1948 on the islands, however, have revealed that the Aleuts of 2000 years ago were not 'short-heads' as formerly supposed (p. 133), but 'long-heads,' much more like the present Eskimo. These skulls also indicate that the Aleuts of those distant days were several inches taller than the race which the Russians found

on the islands, and may have been the fortunate—or unfortunate—possessors of three sets of teeth !

The Aleutian Islands are now an immense wild life reserve, the breeding-ground of millions of sea-birds and rare sea-otters and other animals. Several other areas on the mainland of Alaska are now reserved as National Parks, there are two National Forest Reserves—Tongass and Chugach—and by her Wild Life Service, her game laws and game wardens, the United States is doing very valuable work to-day in an effort to preserve the formerly squandered wild life resources of her vast Territory.

[1] *Alaska.* By FRITZ BARTZ. 9×6. Pp. vi+384. 25 figs. 47 photographs. 214 references. [Geographische Handbücher (Friedrich Ratzel and Albrecht Penck), edited by Hermann Lautensach.] Stuttgart: K. F. Koehler, 1950. *DM* 28.

REVIEWS OF BOOKS

EUROPE

The Dawn of European Civilization. By V. GORDON CHILDE, D.LITT., D.SC. 9½×6. Pp. xix+362. 155 figs. 4 maps. London : Kegan Paul, Trench, Trubner and Co. Ltd. Fourth edition, revised, 1947. 28*s.*

A new edition of this long-accepted standard work on European pre-history was necessitated by the destruction of the previous edition during the war. But of more importance, as the author states in the preface, was the necessity to include new information which had become available, particularly from Soviet sources. This has resulted in a complete revision of the book. The work is still not completely up-to-date owing to the fact that the material collected in Germany and elsewhere in Central Europe during the war was still not forthcoming at the time of writing.

Apart from these acknowledged and unavoidable omissions, it is a first-class account and analysis, illustrated with superb line-drawings, of the spread of the elements of civilised life from the Near East, westwards and northwards through the Mediterranean and across the European continent. In accordance with his well-known technique, Professor Childe not only describes these elements but interprets them so as to give, as far as is possible and reasonable, a picture of the cultural, social, and religious life of these early communities. As such, his book is not only an extremely well-documented and learned work but is also an enlivened account which is acceptable to the interested general reader. R. M. P.

Scotland. Edited by L. RUSSELL MUIRHEAD, M.A.(CANTAB.). 6¼×4. Pp. lviii+453 +(atlas) 32. 34 maps and plans. [The Blue Guides.] London : Ernest Benn Ltd. Third edition, 1949. 21*s.*

The third edition of this well-known guide-book meets the trend of present-day travel by having been recast so as to base the routes primarily on the road system, and railway routes now take second place. The book is still by far the most comprehensive guide to Scotland ; on Edinburgh alone the text runs to forty-two closely printed pages. In addition to a complete atlas of Scotland on the scale of 10 miles to one inch, maps of popular areas on the scale of 4 miles to the inch are provided.

Although revised to 1949, it is not everywhere up-to-date : under Edinburgh it still includes the railway to North Leith, on which the passenger service has ceased, and it gives the hotel at Glenelg which was burned down some years ago. Too much reliance should not be placed on the quoted hotel prices : since the information was collected by the publishers many hotels have raised their tariffs.

D. G. M.

A Book of Scotland. By GEORGE ROWNTREE HARVEY. 10×7½. Pp. vii+216. 31 plates in colour. 32 photographs. London: Adam and Charles Black Ltd., 1949. 16*s.*

The first part of this book deals with Places and History, and is a general, if somewhat rambling, account of Scotland from all aspects but stressing particularly the historical. It is written from the personal point of view and inevitably includes some of the author's own philosophies on Scotland and the Scots. The second part —The Arts in Scotland—contains chapters on Literature, Art, Music and Drama. For all subjects the historical development is traced. Although we are told that Music and Drama were for long the Cinderellas of the Arts in Scotland, the book finishes on a note of optimism and of national pride. P. M. H.

The Western Isles. By ALASDAIR ALPIN MACGREGOR. 8½×5½. Pp. xi+366. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd., 1949. 15*s.*

This attractive addition to *The County Books* deals with the Outer Hebrides. Geographers may quarrel with the title, for the Western Isles include both Inner and Outer Hebrides. "The name Hebrides," as the author remarks, "carries with it something which stirs the imagination. It is one of the loveliest in our language." It seems a pity, therefore, that he has discarded it. Readers will find much to instruct and delight them in this well-produced volume, which might well have been named 'The Fortunate Isles': so many kindly proprietor-philanthropists, not excluding in recent times the Government, have poured out money upon them like water in a disinterested endeavour to improve the economic position of their rather unresponsive inhabitants. It is pleasant to find Lord Leverhulme's magnificent generosity in this connection dwelt upon at length with sympathy and appreciation.

Mr. MacGregor takes the privilege of old acquaintance and does not hesitate to censure his fellow-islanders severely for their ingratitude and other vices, the chief of which is intemperance. His description of Stornoway is distressing, and he dwells a little too much on the grim side of island life in his endeavour to avoid 'sentimentality.' The Gael's loyalty to King and country, his imaginative power, his shrewd humour and unhurried serenity may not be so lightly dismissed. The author is at his best when writing objectively of the natural history and archaeology of the Long Island, and the chapters dealing with these matters should lure many visitors to explore the Outer Isles for themselves and to form their own opinion of their hospitable inhabitants. I. W. H.

Studies in Regional Planning: Outline Surveys and Proposals for the Development of Certain Regions of England and Scotland. By G. H. J. DAYSH (Editor), and A. A. L. CAESAR, K. C. EDWARDS, ARTHUR GEDDES, J. M. HOUSTON, A. C. O'DELL, F. D. N. SPAVEN. 10×6. Pp. xxiv+223. 8 maps. London: George Philip and Son Ltd., 1949. 25*s.*

The Highlands and Isles: Their Regional Planning. By ARTHUR GEDDES, PH.D., D. ès L., and F. D. N. SPAVEN, M.A. 9½×6. Pp. 53. 4 photographs by R. M. Adam. 2 coloured maps. Edinburgh: The Outlook Tower, 1949. 5*s.*

The authors of these surveys are rightly "convinced that there is a real contribution to be made to planning by geographers" in presenting "the appropriate material upon which to base a regional plan." In these thorough, though concise, regional studies, they have demonstrated not only the indispensability but also the possibilities of their discipline. The seven regions selected from England and Scotland are studied by geographers experienced in research for planning in the region discussed. A summary statement is given of the essential physical, economic and social facts relevant to current planning problems.

In stressing the items "which represent the keys to the present situation in the area," the authors have laid particular emphasis upon the economic aspect. This is justifiable for obvious practical reasons. Dr. Geddes and Mr. Spaven, in their treatment of the Highland and Isles, the more extensive region, have taken due advantage of the greater amount of space allowed them, by presenting a more proportionate account of the social aspect. S. F. C.

Shetland Sanctuary : Birds on the Isle of Noss. By RICHARD PERRY. 8½×5½. Pp. 300. 44 photographs. 2 maps. London : Faber and Faber Ltd., 1948. 25*s.*

This book is mainly concerned with the breeding birds of the island of Noss—a famous bird sanctuary. There are many useful and valuable notes on the breeding biology of great and arctic skuas, and also on gannets. The first part of the book contains some good descriptions of Lerwick, the grandeur of Noss, and the hospitality and industry of the people of Bressay.

Most readers would expect better photographic reproduction in a book of this price. G. W.

Highland Holiday : Afoot in Scotland. By F. ALEX WILLS. 8½×5½. Pp. 176. 12 illustrations. End-paper sketch maps. Newcastle-upon-Tyne : North-East Publications, 1947. 10*s* 6*d.*

In this book is described a walking tour in 1947 through Scotland to Skye, Wester Ross, and John o' Groats. Those who like personal records of travel will enjoy it, but frequently the topographical details are confusing and inexact. Mr. Wills has a good deal to say on Scottish history, and concludes, " Nowhere had I come across history that was not biased, or romance that was not distorted."

A. R. M.

A Camera in the Cairngorms. By W. A. POUCHER, F.R.P.S. 10×7. Pp. 144. 93 photographs. End-paper maps. London : Chapman and Hall Ltd., 1947. 21*s.*

Mr. Poucher here gives a superb camera record of the Cairngorms. His own photographs cover every aspect : mountain summits, valleys, lochs, rivers, and forests—showing that he has taken his camera into the least known corners as well as over the popular routes. The descriptive text adds to the value of the book. Those interested in the author's photographic technique will welcome his notes and tabulated data. A. R. M.

Country Walks in Scotland. By TOM S. HALL. 7×4¾. Pp. 63. 3 figs. 4 photographs. Falkirk : The Wayfaring Association, 1948. 2*s* 6*d.*

A booklet containing brief descriptions—reprinted from the *Glasgow Evening Citizen*—of twenty-one rambles, suitably illustrated. The Ben Cleuch indicator chart is welcome. J. H. K.

That Portion of Scotland which lies around Dunfermline and stretches westwards to Kincardine-on-Forth. By JOHN WESTWOOD, F.S.A.(SCOT.). 7½×5. Pp. 224. 14 illustrations. Dunfermline : Herbert T. Macpherson, 1948. 10*s* 6*d.*

Mr. Westwood—J. W. Ness of the *Dunfermline Press*—writes with intimate knowledge of a district which is little publicised but one which is rich in history. Around Torrie, Culross, and Dunfermline were Scotland's earliest coal mines and salt pans. To record their story and the lives of some of the natives of a region which produced among other notables Stevenson's " Cummy," Lilias Adie the Witch, and a succession of Scotland's ablest mariners, has been a labour of love for Mr. Westwood. His book is to be warmly commended to all interested in local history, and the publishers and Carnegie Trust, who made publication possible, are to be congratulated on its artistic production. There are some excellent photographs, and the little book is a valuable addition to local Scots history. I. W. H.

Woodland Crafts in Britain : An Account of the Traditional Uses of Trees and Timbers in the British Countryside. By H. L. EDLIN, B.SC. 8½×5½. Pp. x+182. 159 illustrations. London : B. T. Batsford Ltd., 1949. 15*s.*

The purpose of the book is " to describe the whole range of woodland crafts that use timber or tree products as practised in Britain at the present day or in recent times." The commercial importance of some of these crafts is no longer what it was and some are dying out, but the author believes that, in spite of modern machinery, some of them will be kept alive by artistic merit. While he acknowledges his debt to a long list of publications, it is quite obvious from the text that he has obtained most of his information from direct contact with the craftsmen concerned.

After the introductory matter dealing with general questions of forestry, a chapter is devoted to each one of our well-known British trees, deciduous and coniferous—one to shrubs and rarer trees—and to the peculiar industries associated with each. The author's investigation has taken him all over the country and brings us into touch with countless very useful, highly specialised and chiefly forgotten occupations, their methods and tools, and incidentally with a very curious vocabulary of old but still living technical terms. The book is profusely illustrated and is altogether a pleasing production. R. T. C.

English Place-Names. By H. G. Stokes. 8½×5½. Pp. viii+120. 64 illustrations. London : B. T. Batsford Ltd., 1948. 12*s* 6*d*.

England is particularly rich in its variety of place-names, for so many of them are rooted in the times when the country was open to settlers from many regions, with different languages, customs and cultures. Though the names still bear the stamp of their origin, the process of time has changed their appearance almost beyond recognition. The author's treatment cannot fail to stimulate the reader's interest and to encourage him to explore the factors, whether it be some peculiarity of natural vegetation or of topography, or some detail of the original settlement, which are incorporated in the name of his own town or village.

The book does not pretend to be exhaustive, for the reader's own town may not be mentioned, especially if he lives in the north. Perhaps the chief fault of the book is that in the choice of examples the south of England preponderates. Shelf, in Yorkshire, for instance is a surprising omission from the examples of place-names derived from the Old English *scylf*. In northern names, errors also creep in : two street names in York, for example, are explained, but no such streets exist. There is a useful glossary, and a good index. The numerous illustrations are well chosen. S. C. F.

National Trust Guide : Buildings. By James Lees-Milne. Foreword by Lord Esher. 7½×5. Pp. viii+184. End-paper maps. Illustrations by S. R. Badmin. London : B. T. Batsford Ltd., 1948. 7*s* 6*d*.

This is an account of more than one hundred buildings, properties of the National Trust, in England and Wales, but for the most part in the former [cf. *S.G.M.*, 1946, 62 (1) : 38]. Arranged by counties, information is given for each building as to its situation, arrangements and prices for admission, with a brief history and notes on its architectural features. End-paper maps show the location of the sites.

Within the limits of the available space, and enhanced by some attractive but all-too-few line drawings, the book is calculated to excite the curiosity of those interested in some of the historic and architecturally valuable buildings preserved by the Trust. After reading it, they will wish to visit them and learn more. R. M. P.

Lorna Doone Country. Photographs by S. W. Colyer. Foreword by Lord Gorell, C.B.E., M.C. 11½×9½. 33 reproductions in gravure, each with a commentary. [Fair Britain Series.] London and Melbourne : Ward, Lock and Co. Ltd., 1947. 7*s* 6*d*.

Popular interest in Exmoor may be attributed largely to R. D. Blackmore, and will be agreeably stimulated by these interesting illustrations and commentaries. The reproduction of inland and coastal scenes in " this delectable region " praised by Lord Gorell is commendable. J. H. K.

The Norman Isles. By Basil C. de Guerin. 7½×5. Pp. 104. 30 illustrations. Oxford : Pen-in-Hand Publishing Co. Ltd., 1948. 5*s*.

Written by a native of Guernsey, this brief description of the Channel Islands and of the history and activities of the islanders is of value and very readable. Due reference is made to the effects of the German occupation during 1940-1945. Unfortunately the quality and, to some extent, the selection of the illustrations—they fail to convey the 'atmosphere' of the islands—do not match with the excellence of the letterpress. J. H. K.

Dredge, Drain, Reclaim : The Art of a Nation. By Dr. JOH. VAN VEEN. Foreword by Dr. J. A. Ringers. 10×7¼. Pp. 167. 95 figures, photographs, and maps. The Hague : Martinus Nijhoff, 1948. *fl.* 12.00.

Throughout the past twenty-four centuries, floods and human endeavour have wrought great changes in the Netherlands. The reclamation of Walcheren and draining the Zuider Zee are recent and familiar examples of the assiduity and ingenuity by which the Dutch have enriched their heritage. But no comprehensive account of the work of reclamation through the ages had been published so far. The story is now authoritatively told for the first time, and in English, by the chief engineer of the government organisation concerned, the Rijkswaterstaat. In the foreword, the former Minister of the Waterstaat tells of the circumstances which led to the writing of this book.

Dr. van Veen gives an account of the protagonists and workers involved in their arduous task, of their disappointments and achievements, and of the methods employed : from the first iron spade to sluices and later, windmills, and to the suction dredgers and pumps of to-day. It is a readable and instructive story, rendered more so by the excellence of the accompanying illustrations, and one which fully justifies the author's remark that " nations which have developed their own country have no cause for regret." Nor is the story confined to the Netherlands : modern Dutch reclamation and harbour work throughout the world is also reviewed and illustrated. J. H. K.

ASIA

Die Pilgerfahrt nach Mekka : Von der Weihrauchstrasse zur Ölwirtschaft. By CARL RATHJENS. 8¼×5¾. Pp. 144. 21 photographs. 10 sketch maps. Map of environs of Mecca (1 : 423,000). [Hamburgische Abhandlungen zur Weltwirtschaft.] Hamburg : Robert Mölich Verlag, 1948.

A very valuable book, and by no means easy to read. It is really a longer work than it looks at first, and its material get-up is not attractive : the type is clear but small, the page is very closely printed, and the quality of the paper is so poor that neither letterpress, nor the photographs, nor the important sketch maps are as effective as they deserve to be.

The text is very solid, the product of patient scholarship, and calls for sustained attention on the part of the reader. Starting from the natural geological and geographical basis, the development of the Incense Road is traced from earliest times, through the foundation of Islam and the institution of the pilgrimage to Mecca, down to the present era of petrol. The author shows how local well-being has depended successively on these three factors : the through spice trade from further east to the Mediterranean, religious obligations imposed by the Quran, and the exploitation of oil. One cannot fail to be impressed in the second chapter by the facility with which he handles thousands of years of history. R. T. C.

Two Mountains and a River. By H. W. TILMAN. 8½×5½. Pp. xii+233. 36 plates. 6 maps. Cambridge : University Press, 1949. 21*s.*

This is a delightfully told tale of a journey into Central Asia in 1947. Mr. Tilman, suffering from the feeling so many of us have experienced after a war, decided to get away from the crowd for a bit, and his thoughts naturally turned to the Himalayas. At first he intended to travel as, where, and when he pleased, with a few Sharpas, but was invited to accompany a pair of Swiss mountaineers who intended to climb Rakaposhi (25,550 ft.) at the western end of the Karakoram Range.

After an unsuccessful attempt to find a possible route up this mountain, Mr. Tilman left the party and travelled through Hunza to join Mr. Shipton, who is British Consul at Kashgar. They met at Tashkurghan, and on their way to Kashgar attempted to climb Muztagh Ata. As Mr. Tilman puts it : " Did not Confucius say : ' The wise find pleasure in waters, the virtuous in mountains,' and again the epigrams of Chang Ch'ao tell us : ' If there are no famous hills then nothing need be said, but since there are, they must be visited.' " They did not succeed in reaching the summit, and, as both Tilman's and Shipton's feet were frost-bitten, they could not make another attempt.

After spending three or four weeks at Kashgar, Mr. Tilman decided to return by the source of the Oxus and see something of the Hindu Kush. This involved crossing the Afghan frontier, but, as he says, it was a very remote part of Afghanistan, and there was not likely to be any fuss about passports there. In this he was mistaken. Apparently the frontiers in Central Asia are just as carefully guarded as those in Eastern Europe, and, as soon as he entered Afghanistan, he was placed under arrest and handed over from one police post to another, being finally escorted to the frontier above Chitral.

As said before, the book is very entertainingly written. The photographs are excellent, but it is a great pity that they have not been enlarged, and placed opposite the appropriate page of the text. T. E. D.

AFRICA

Journey under the Crescent Moon. By NINA EPTON. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. 286. 22 illustrations. Sketch map. London : Victor Gollancz Ltd., 1949. 18*s*.

The author, an English journalist, went to French North Africa as a traveller interested in its colourful history, but " the voices of the present proved stronger than the voices of the past." Her book is an attempt to view the present political and economic situation in the region from the nationalists' viewpoint. She identifies herself completely with the Muslim population, whose present plight and future aspirations she depicts with feeling and warmth. There are intimate portraits of leading political personalities, and considerable space is devoted to the description of local customs and social life. In her indignation at French political repression and economic exploitation, the author loses her objectivity and has not given credit for the more positive results of French rule in rescuing these countries from mediaeval stagnation and in introducing modern transport, agriculture, and industry.

M. A. B.

Whither South Africa? By DOUGLAS G. WOLTON. Foreword by William Gallacher, M.P. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. 155. 12 photographs. London : Lawrence and Wishart Ltd., 1947. 10*s* 6*d*.

This is a political treatise written with evident sincerity but containing little of value to the geographer. The subject-matter is the well-known problem of the political evolution of South Africa with its mixed population, and though the author is pleading the cause of the negro, it is painfully evident throughout that he does not understand the negro nor his psychological make-up. The communistic bias of the author distorts the whole picture. This book offers no practical solution to the problems of South Africa ; it only pours a smoke-screen over them. R. R. W.

AMERICA

L'Amérique. By JEAN GOTTMANN. $9\times5\frac{1}{2}$. Pp. 451. 74 figs. 52 photographs. 9 coloured maps. [Les Cinq Parties du Monde.] Paris : Librairie Hachette, 1949. 980 *fr*.

This is the first volume of a series designed to offer the general reader a geographical picture of the contemporary world. It has special interest as an attempt to comprise in a single study both the so-called Anglo-Saxon America and Latin America. Professor Gottmann has spent a number of years in the Americas, part of the time on the staff of the United Nations and latterly as a member of the Institute of Advanced Studies at Princeton. The book has additional interest as one in which a writer in the French humanistic tradition seeks to interpret the processes and tendencies arising from the contact of European cultures with the natural phenomena of the Americas. While mentioning the historical elements that give these countries a certain family likeness in European eyes, the author returns from time to time to the contrasts in social evolution north and south of the Rio Grande. In North America the Calvinist and Rationalist impulses to the conquest of nature —*la foi motrice de la mise en valeur*—developed an individualist society, while in Latin America a stable, stratified Catholic society was established.

Regional differences are considered as reflecting the manner and degree of organisation of area. Turning specifically to the United States, the author emphasises the longitudinal belts rather than the contrasts between latitudinal belts, which he

considers to be diminishing in significance. There is a fascinating analysis of the paradox that in the freedom-loving States a high degree of social conformity had to be imposed. Only thus were centrifugal forces held in check, and it was not only in the economic sense that society spread along the great lines of communication by the methods of mass production and the assembly line. The author also has much to say on the American dilemma in race relations.

Altogether the book is one to stimulate much further thought and discussion. The picture is brilliantly illumined by the striking phrase, the telling quotation and the lively aside—for instance the linkage in certain parts of Latin America between Christianisation and soil erosion. Although he concludes by contrasting the North American mystique, so potent an activating factor in the geography of the continent, with the more sceptical European tradition, it is apparent that Professor Gottmann sees something of the Bergsonian *élan vital*, to which he refers in his opening pages, operating on the American scene. C. J. R.

Company of Adventurers : The Story of the Hudson's Bay Company. By Louise Hall Tharp. 8×5¼. Pp. 238. Illustrations by Charles B. Wilson. Decorative end-paper map. London : George G. Harrap and Co. Ltd., 1949. 8*s* 6*d*.

A pleasantly written history of the Hudson's Bay Company from its inception in 1670 to the present day. It deals mainly with activities in the field, giving less attention to the political aspect. The value of the book is enhanced by the author's personal knowledge of much of the Company's territory. There are several woodcuts and an adequate map. The book can be strongly recommended.

R. N. R. B.

A Summer on Hudson Bay. By Mrs. Tom Manning. Appendix on the Birds of North-Western Ungava, by T. H. Manning. 8×5½. Pp. 224. 24 illustrations. End-paper sketch map. London : Hodder and Stoughton Ltd., 1949. 12*s* 6*d*.

In her second delightful book on the Canadian Arctic, the author of *Igloo for the Night* describes life in Ungava and little-known parts of Hudson Bay, where she accompanied a geodetic expedition with her husband in the summers of 1945 and 1946. Certain ground control points were fixed for the air photographic survey conducted by the Royal Canadian Air Force, and Mrs. Manning was the first woman to be employed by the Geodetic Survey of Canada in such work. In 1945 the journeys were carried out chiefly by air, but in the following year her husband was selected for coastal work in small boats where planes could not readily land, and it is chiefly with this interesting summer that the book deals.

Her readers will rejoice with her that the Geodetic Survey broke a " long-standing tradition " in her favour, and thus enabled her to be the mouthpiece of a rather inarticulate service, whose work she has made interesting and colourful. She describes with sympathy and charm the men and women, natives and others, who inhabit these remotest outposts of the Hudson's Bay Company, and her husband supplies a very valuable appendix of the bird life of NW Ungava, with a bibliography. A better map than the inadequate end-papers would have been more satisfying to the geographically minded of her readers. I. W. H.

Driftwood Valley : A Story of Life in a Canadian Wilderness. By Theodora C. Stanwell-Fletcher. 8½×5½. Pp. 288. 2 figs. 19 plates, including sketches by John F. Stanwell-Fletcher. London : George G. Harrap and Co. Ltd., 1949. 15*s*.

Mrs. Stanwell-Fletcher's story of her life in the remoter fastnesses of British Columbia, where she lived alone with her husband during the period 1937-41, makes fascinating reading. With the object of studying wild life throughout the year, the couple collected for the British Columbia Provincial Museum of Vancouver, which provided the necessary permits and identified species of animals and plants, lists of which are appended at the end of the book. Mrs. Stanwell-Fletcher's descriptions of such animals as wolves, moose, and grizzlies at very close quarters—for both she and her husband preferred to do their collecting when possible by camera rather than rifle—are deeply interesting. It is pleasant to read a book in which the main

objective is not that of extermination of wild life, though the cruel steel trap was, unfortunately, not altogether abandoned in the hunt for museum specimens.

Mr. Stanwell-Fletcher contributes pencil drawings of great sincerity, depicting the animals seen. His insight makes each creature seem an individual, as indeed it is, and makes it live for the reader. This is a book which will delight all lovers of the wilderness. I. W. H.

The History of the Isle of Providence. By JOHN OLDMIXON. Introduction by Richard Kent. 9×6½. Pp. 30. Cover design by Basil Peek. London : John Culmer Ltd. Reprinted from the last edition (1741), 1949. 10*s.*

Bahamian Interlude : Being an Account of Life at Nassau in the Bahama Islands in the Eighteenth Century, reprinted from the " Memoirs of PETER HENRY BRUCE, Esq.," published in London in 1782. Introduction by Richard Kent. 9×6½. Pp. 62. Cover design by Basil Peek. London : John Culmer Ltd. Edition limited to 500 copies, 1949. 12*s.*

The publishers have reprinted very attractively two eighteenth-century accounts of life in the Bahamas—the first, the reminiscences of a resident ; the other, the record of a visitor. Together, they cover eighty stormy years preceding 1745. Their value is enhanced by excellent introductions from the pen of Richard Kent.

Oldmixon's manuscript can be summarised as a record of brawls between turbulent residents and successive governors. The former failed to realise that, in accordance with the ethics of their time, governorships existed primarily for their holders to amass personal wealth.

Bahamian Interlude is the more valuable of the two reprints. Peter Henry Bruce was a military engineer, grandson of a Scottish soldier-of-fortune. After a most varied career in Prussian and Russian service, Peter Henry returned to the land of his ancestors and in due course was commissioned to fortify the Bahamas. His memoirs are a valuable source of information, for Bruce was observant and a man of high integrity, standing above both the squabblings of the islanders and the corruption of the men sent to rule them. For a fair picture of conditions in the Bahamas at this period *Bahamian Interlude* can be very strongly recommended. Bruce's account ends with an interesting episode, although nothing to do with the West Indies. He travelled home by a warship which in the Channel exchanged salutes with two ' Dutch ' men-of-war. One of the ' Dutch ' vessels carried a distinguished passenger and sailed north to land him—at Eriskay. C. R. V. G.

Islands in the Sun. By ROSITA FORBES. 8½×5½. Pp. 167. 33 illustrations. 2 end paper sketch maps. London : Evans Brothers Ltd., 1949. 12*s* 6*d.*

" . . . Barbadoes is all set for tourism. Right on the docks there is welcome in the shape of an admirable Information Bureau. . . ." Here is the note of a new book on the West Indies and their problems. The author has been at pains to point out the individuality of each island and group, and where it differs from its neighbours. This is something the reader will appreciate. A final chapter sketches adequately the problems common to the whole area. Beautiful photographs bring a yearning to visit these lovely tropical islands. Should the reader wish to include the most prosperous of them all, he may be grateful for the information that he can " travel easily by . . . which won in 1948 for the fifth year in succession the U.S.A.'s Air Safety Council award for operation without injury to passengers," but he will probably begin by looking for Curaçao on the map of the West Indies provided. Unfortunately, he will seek in vain. C. R. V. G.

Tropic Adventure : Rio Grande to Patagonia. By WILLARD PRICE. 8½×5½. Pp. x+336. 18 photographs. End-paper sketch maps. London : William Heinemann Ltd., 1949. 21*s.*

A journalist of wide experience, Mr. Price writes of an aerial journey from Mexico to Patagonia, visiting all the republics of Latin America for longer or shorter stays. There is no uniformity of treatment, and there is no monotony or dullness. In each land, Mr. Price writes of some human problems of economic or political interest, and succeeds in giving a vivid picture of the lands he visited. There is colour and atmosphere in an entertaining volume. R. N. R. B.

The Condor and the Cows. By CHRISTOPHER ISHERWOOD. 8½×5. Pp. xvi+195. 94 illustrations, sketch map, and end-papers, by William Caskey. London: Methuen and Co. Ltd., 1949. 21*s.*

A South American travel diary is always welcome: especially so when the author is a writer of established reputation like Mr. Isherwood. His six months' journey, during 1947-48, led him by a devious route from Colombia to Argentina and, as might be expected, he made good use of this time, so that his readers will be delighted with this new representation of a fascinating continent. Indeed, this book is a mirror of the life of a country little known and imperfectly understood on this side of the world.

As might be expected, the author is more deeply interested in people than in scenery. He penetrated into Latin American society of all grades: artists and writers, cowboys—gauchos—and schoolboys, prisoners and politicians. All those types come very much alive in his pages. The photographs are also mainly personal, and unusual. The reader may visualise the true life of the continent, and although he will encounter neither condors nor cows, he will appreciate a delightful guide in the author and will enjoy meeting all his interesting 'contacts.' D. G.

OCEANIA

Six-Legged Snakes in New Guinea: A Collecting Expedition to Two Unexplored Islands. By EVELYN CHEESMAN, F.R.E.S. 8×5½. Pp. 281. 11 line illustrations. 31 plates. 3 sketch maps. London: George G. Harrap and Co. Ltd., 1949. 12*s.* 6*d.*

A rather unfortunate title seems to suggest that this book is the narrative of a Hollywood camera expedition more concerned in wooing publicity than recording fact. Actually the author presents a sober but attractive record of a year's scientific work at points along the north-west coast of New Guinea. This one-woman expedition was made in 1938-39, and publication of the book was delayed by greater events in the same general area.

The narrative is well written and never palls. The personal element has been cut down to a happy and irreducible minimum, and no long passages of a semi-technical character bore the general reader. The full-page photographs and the sketches in the text are attractive, but the smaller photographs tend either to lack real interest or else to be too detailed for reproduction on so small a scale.

C. R. V. G.

POLAR REGIONS

To the Arctic! The Story of Northern Exploration from Earliest Times to the Present. By JEANETTE MIRSKY. Introduction by Vilhjalmur Stefansson. 9½×6¼. Pp. xxii+334+xviii. 31 illustrations. 8 maps. London and New York: Allan Wingate Ltd., 1949. 21*s.*

Many attempts to write the history of Arctic exploration have been made. The task is difficult. A chronological summary of ships and men is wearisome except to the explorer. Choice must be made, but a balance must be kept. The tendency is to dwell on the sensational voyages and sledge journeys. Thus the Franklin expedition, which really accomplished little, usually gets lengthy notice, and the strenuous journeys of the Hudson's Bay Company's factors, unaccompanied by failure or disaster, get scanty mention.

Miss Mirsky has managed in the main to avoid the pitfalls of the Arctic historian and has evolved a full, well balanced, and accurate book, the best of its kind that has yet appeared. Mistakes are few and unimportant. A little more might have been said of work in Spitsbergen, especially North-East Land, and also perhaps of work in Greenland. There are useful maps, well chosen illustrations, and a fairly full bibliography. The book is a revised and amplified edition of the author's *Northern Conquest,* published in 1934 [see *S.G.M.*, 1935, 51 (*4*): 254]. R. N. R. B.

New Light on Franklin. By Rear-Admiral (S) Noel Wright, c.b., o.b.e. (Rtd.). 7½×5. Pp. 125. 7 illustrations. Bibliography. [Privately printed.] Ipswich and London : W. S. Cowell Ltd., 1949.

In this small book, Rear-Admiral Wright examines anew the conclusions that have been generally accepted regarding the fate of the Franklin expedition and the loss of the *Erebus* and *Terror*. The evidence available from search expeditions and the one record is scanty, and leaves several problems unanswered. Admiral Wright has no new information, but he argues skilfully from the facts available and reaches several new conclusions, some of which may prove more acceptable than theories previously held.

His main conclusions are four : Franklin, whose death was recorded on June 11th, 1847, was not buried at sea, but near the site of Ross's Magnetic Pole, his grave being despoiled by Eskimo soon after the funeral ; secondly, that the two ships reported on a floe off Newfoundland by the *Renovation* in April 1851 were the *Erebus* and *Terror* ; thirdly, that a missing record is lying buried, but probably illegible through weathering, near Franklin's first winter quarters at Beechey Island ; and fourthly, that the wreck reported more than once by Eskimo was neither *Erebus* nor *Terror* but the *Investigator*, abandoned in 1853 in Mercy Bay.

The book should be read along with V. Stefansson's *Unsolved Mysteries of the Arctic* [see *S.G.M.*, 1939, 55 (*6*) : 344], for the dire results of scurvy must not be overlooked. R. N. R. B.

The Antarctic Ocean. By Russell Owen. 9×5½. Pp. 225. 14 plates. 12 sketch maps. London : Museum Press Ltd., 1948. 18*s*.

The title of this book is a little misleading since it deals mainly with discoveries of land. While disclaiming to have written a history of Antarctic exploration, the author has traced some of the main work from early days until recent times. His omissions, however, are serious : two lines to Bruce's *Scotia*, little more than mention of Mawson, and J. K. Davis and Rymill, and nothing of the recent work of Norwegians and Germans, and of *Discovery II* and *William Scoresby*. But the book, as far as it goes, is well written and has few inaccuracies. The author had experience of the Antarctic with Admiral Byrd. R. N. R. B.

Stepping Stones to the South Pole. By J. R. Nichol. 8½×5½. Pp. xxi+199. 30 illustrations. Sydney and London : Angus and Robertson Ltd., 1948. 15*s*.

Beginning with an expression of indebtedness to H. R. Mill and of regard for his work on the history of the Antarctic, the author of this book falls away sadly. This is not a judicial history and has little respect for balanced judgment, and in places lacks factual accuracy. Probably the title is not intended to be taken literally, but even if it were, the pages give a scanty record. The *Quest* finds place but not the *Deutschland*, the *Endurance* but not the *Penola* nor the *Pourquoi Pas?*, *Français* and *Scotia* get little notice, and several facts about the *Scotia* are wrong. The bibliography is lamentably deficient, and the chronology is incomplete. R. N. R. B.

CLIMATOLOGY

Klimaat : Klimaattypen, Klimaatgebieden, Bodemproduktie, Bevolkning. By W. E. Boerman. 7½×5¼. Pp. ix+268. 47 figs. [Noorduijn's Wetenschappelijke Reeks, No. 25.] Gorinchem : J. Noorduijn en Zoon N.V. Second edition, 1949. *fl.* 6.

This is an attractively produced little book on climatology. The very clear maps and diagrams make it worth the attention of even the reader with no Dutch. Beginning with an account of the general circulation of the atmosphere, of ocean currents, and of the classification of air masses, Professor Boerman proceeds to an examination of the various ways of classifying climate. The major part of the book consists of an account of the different climatic types, defined according to Köppen. J. P.

Climatology—Treated mainly in Relation to Distribution in Time and Place. By W. G. KENDREW, M.A. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. 383. 125 figs. 16 plates. Oxford: Clarendon Press. Third edition of *Climate*, 1949. 30*s*.

In preparing this volume as the third edition of his well known *Climate*, the author was led to make such extensive alteration, involving additions, curtailments, and rearrangements, that he deemed a change in the title necessary. The book gives a descriptive account of the important features of climate, with short and clear discussions of the physical principles underlying them. It is copiously illustrated with diagrams, and contains a magnificent set of photographs. That a third edition is called for is sufficient evidence of its excellence as an introduction to climatology.

J. P.

Rainfall and Runoff. By EDGAR E. FOSTER. $9\frac{1}{2}\times6$. Pp. xix+487. 179 figs. Bibliography. New York: The Macmillan Company, 1948. $9.00, or 45*s*.

This is essentially a book for the specialist in hydrology, the science that deals with water in its terrestrial cycle of evaporation, distribution, precipitation, and runoff. The author, an engineer of the U.S. Bureau of Reclamation, is mainly concerned in the application of statistical methods to the analysis of hydrological data, *e.g.* to precipitation frequencies and to the distribution and frequency of floods, with the aim of improving the accuracy of prediction. Stressing the economic utility of these methods, he supplies in detail illustrative examples from his own experience in water control projects in different parts of the U.S.A.

It is significant that of the two hundred items listed in the bibliography at the end of the book, only one—Karl Pearson's *Tables for Statisticians and Biometricians*—is not American.

J. P.

POLITICAL GEOGRAPHY

World Political Geography. By G. ETZEL PEARCY, RUSSELL H. FIFIELD, and Associates. 10×7. Pp. xv+653. Maps by Robert J. Voskuil. New York: Thomas Y. Crowell Co., 1948. $6.50.

Thirty-four authors contribute to this book, which is a survey of all the political regions into which the world is divided, with supplementary chapters on the oceans, boundaries, and population problems. The over-all picture which develops from this composite treatment is one of a continuous struggle for power. There is an underlying assumption that the primary function of a State is to organise its people, its resources and whatever geographical advantages it may possess, for exerting power. Consequently the view of the State, with its great variety of interests, activities and functions, becomes somewhat distorted.

S. C. F.

Geography Behind Politics. By A. E. MOODIE, B.A., PH.D. $7\frac{1}{2}\times5$. Pp. 178. 6 sketch maps. London: Hutchinson's University Library, 1949. 7*s* 6*d*.

This is an admirable study, in general terms, of the struggle of Man to adjust his community life to his geographical environment. The stability of a State is largely a measure of the success with which the adjustment has been made. Although for purposes of analysis internal and external relationships are necessarily treated separately, the author emphasises that in practice they are closely intertwined and that, so far, no satisfactory adjustment to world geographical conditions has been worked out. He makes a plea for a close co-operation of States, both regionally and functionally, so that the way may be opened to a world unity which will mark the fully developed adjustment of Man to the widest environment.

S. C. F.

New Compass of the World: A Symposium on Political Geography. Edited by HANS W. WEIGERT, VILHJALMUR STEFANSSON, and RICHARD EDES HARRISON. $8\frac{1}{2}\times5\frac{1}{2}$. Pp. xix+375. 26 figs. London: George G. Harrap and Co. Ltd., 1949. 21*s*.

Here is a volume of considerable importance. Twenty-three articles, of which some have been published previously [see *S.G.M.*, 64 (*3*): 168], cover most of the great problems of current political geography in Europe, Asia, and polar regions.

Among the authors are V. Stefansson, J. W. Watson, C. B. Fawcett, G. B. Cressey, G. C. L. Bertram, and J. R. Smith. All the articles are of value and cover broad problems of state policy. An article on Antarctic spheres of interest contains the valuable suggestion that all Antarctica might be placed under United Nations trusteeship. The bickering between six or seven nations over territories of no economic value and liable to be unapproachable is imperialism run riot and unworthy of intelligent statesmen. R. N. R. B.

EDUCATIONAL

A Textbook of Geomorphology. By PHILIP G. WORCESTER. 9×6. Pp. vii+584. Frontispiece. 385 figs. New York : D. Van Nostrand Company, Inc. Second edition, 1948. London : Macmillan and Company Ltd. 30*s.*

One of the standard text-books of geomorphology, it has been changed a little in this new edition. The illustrations have been improved, and this, with the high quality of the paper, makes the volume a most attractive one. Its usefulness to the student has been greatly enhanced by the provision, at the end of each chapter, of a list of U.S. topographic maps which illustrate the topics dealt with.

R. M.

A First Book of Meteorology. By ARTHUR J. STARR, M.SC. (Lond.). 8×5½. Pp. 86. 37 figs. London : George G. Harrap and Co. Ltd., 1949. 5*s.*

This book contains a good elementary account of the weather map and weather forecasting, but the author, in attempting to cover too much ground in his 86 pages, too frequently is led to make general statements, some merely misleading, others quite erroneous.

For instance, he explains the difference in temperature over land and water surfaces as due entirely to radiation : " Land and water surfaces absorb heat at very different rates and therefore the air will show marked differences in temperature according to whether the heat it receives is radiated from a surface of land or one of water." In discussing the meteorological importance of the variability of water vapour content, it is stated that this is " largely because of the ability of water to absorb and emit radiant energy." The fundamental importance of the specific heat and latent heat of vaporisation of water is never even mentioned. But surely this is the most remarkable sentence ever printed in a text-book of meteorology : " In calm air the temperature falls with increasing height since it received its heat from the earth by radiation."

J. P.

Climatic and Weather Exercises. By W. G. V. BALCHIN, M.A., F.R.G.S., F.R.MET.SOC., and A. W. RICHARDS, M.A., B.SC., F.R.MET.SOC. 9¾×7½. Pp. 79. 38 figs. 8 maps. London : George G. Harrap and Co. Ltd., 1949. 6*s.*

The exercises provided in this book, though not graded, are designed for use at all stages of a school geography course leading to the Higher Certificate, but the majority are of a standard that will not be reached until the final years. The accounts of the relevant theory and instruments in each section are of necessity concise, but serve to provide most valuable summaries for revisal. The illustrations are excellent. The book can be thoroughly recommended to teachers of geography. But there is one error that they will wish to correct : the decrease in temperature with height in the atmosphere is not due to the decrease in its absorptive power for radiation.

J. P.

Economic Geography. By JOHN MCFARLANE, M.A., M.COM., and C. F. W. R. GULLICK, B.LITT., M.A. 8½×5½. Pp. xi+716. 23 sketch maps. London : Sir Isaac Pitman and Sons Ltd. Fifth edition, 1949. 20*s.*

Amongst text-books of economic geography McFarlane's well known work, first published in 1914 [see *S.G.M.*, 1915, 31 (*3*) : 164-165], was a pioneer in the use of regions inside the framework of national boundaries. The fifth edition has been revised by C. F. W. R. Gullick, principally by the rewriting of the chapters on the U.S.S.R. and Poland, and by the addition of trade figures for pre-war years and totals of exports and imports for 1946.

C. J. R.

Economic Geography. By W. S. THATCHER, M.A. 7½×5. Pp. xiv+241. [Teach Yourself Geography.] London : The English Universities Press Ltd., 1949. 6*s*.

After introducing the subject with a rather old-fashioned subdivision of geography, this book adopts a conversational tone, possibly designed to carry to the outside world something of a tutorial atmosphere. To this reviewer the most successful chapter seemed that on patterns of industry. The later chapters—on the mechanism of exchange, trade and transport—pass frankly into the domain of economics. It is surprising that no explanation has been thought necessary where references to quantum figures are introduced. In the earlier chapters there are a few astonishing statements—*e.g.* regarding Red Indians on page 49. There are many misspellings of proper names and especial carelessness in personal names. There is also a strong tendency to moralise. C. J. R.

France—Union Française : Géographie pour le cours moyen et les classes de 8e et 7e des lycées et collèges. By G. CHABOT and F. MORY. 10½×8½. Pp. 96. Illustrated with photographs, diagrams and maps. Paris : Éditions Bourrelier et Cie. Second edition, 1949. London : George G. Harrap and Co. Ltd. 10*s* 6*d*.

This text-book for nine- to eleven-year-old children in French schools is most attractively produced and has many features to recommend it. There is a brief introduction through the plan of the class-room to maps, scales, and the representation of relief by contours and layer colouring. There follows a general study of France before the more detailed regional examination of the home country. It is in these regional studies that the book excels. Each is shown on a very good layered map with inset photographs of characteristic areas. In addition there are some beautifully coloured photo-relief maps to aid the imagination. Each lesson has a summary with practical exercises which form a solid basis for new acquisitions. The third section of the book gathers up what has been learned of the regions in a presentation of France as a whole. The rest of the book—a very little—is devoted to the French Colonial Empire.

The study of the home country is somewhat more intense than we would expect from our pupils of a similar age. J. Y. E.

Africa. By L. S. SUGGATE, B.SC. 7½×5. Pp. 396. 124 figs. [Harrap's New Geographical Series.] London : George G. Harrap and Co. Ltd. Fourth edition, revised, 1949. 8*s* 6*d*.

As the author says in his introduction to this, the fourth edition, it is not possible to bring the book up to date while the upheavals resulting from the war have not yet subsided. Statistics therefore are unaltered from the third edition, but a six-page introduction helps to modernise the book, particularly as a map of East Africa is included to illustrate the groundnut experiments there. [Second edition, see *S.G.M.*, 1935, 51 (2) : 117.] R. M.

GENERAL

A Dictionary of Geography : Definitions and Explanations of Terms used in Physical Geography. By W. G. MOORE. 7×4½. Pp. 182. Diagrams. 22 photographs. [Penguin Reference Books, R2.] Harmondsworth : Penguin Books Ltd., 1949. 1*s* 6*d*.

An adequate dictionary of geography should be welcome, especially when issued as one of the attractive and inexpensive *Penguin Reference Books*. The title of Mr. Moore's dictionary is somewhat straitened by the more accurate sub-title, and it is therefore a little surprising to notice the inclusion of such terms as Aborigines, Afforestation, Airport, Caste, Mountain Sickness, Protectorate, and the exclusion of Blockfaulting, Overfit, Pedalfer, Pedocal, Tombolo, Underfit, Varve, for instance. Mr. Moore is at his best when dealing with meteorological and climatological terms.

Many geographical terms could be added without increasing the size of the volume, by judicious pruning of some of the explanations given. A few of the latter are not very happy, *e.g.* a bench mark " is placed at the apex of each triangle into which the region being surveyed is divided " ; under Triangulation : " the apices of the triangles are indicated by Bench Marks."

Few, if any, dictionaries are free from sins of omission and commission, and no doubt a greater measure of this freedom will be attained in future editions of this promising volume. J. H. K.

History of Ancient Geography. By J. Oliver Thomson. 9½×6¼. Pp. xi+427. 66 figs. 2 plates. Cambridge : University Press, 1948. 42*s.*

The comprehensive nature of this work bears witness to the statement in the preface that it has taken more years to accomplish than the author foresaw or cares to look back on. Professor Thomson's major contribution is his presentation and analysis of the researches into the many facets of geographical thought, particularly those of the last sixty years. In its general approach to the subject the book differs but slightly from Sir E. H. Bunbury's standard work. However, in a field where the literature is voluminous and widely controversial opinions and interpretations prevail, one welcomes in Professor Thomson's text and extensive footnotes an up-to-date and reasonably balanced study of the ideas and theories of the classical geographers.

One notes in criticism that, while admitting the very much smaller contribution of the Romans to geographical thought as compared with that of the Greeks, the author has devoted approximately equal portions of the book to each. In giving space to the Roman Empire in Africa and Asia, lands which were already well known before Roman times, he might have devoted more to the Greek colonial movement, the knowledge gained in the course of the latter contributing much to Greek geographical writings of the fifth and fourth centuries B.C. The first chapter, on Early Horizons, even if only introductory in its intention, is a trifle thin. The last chapter might well have been omitted since it deals with the post-classical period to the revival of Ptolemy in the fifteenth century. As the chapter stands, it covers most cursorily a period which, in spite of its marked bias in geographical thought, is nevertheless an extremely interesting one.

The illustrations are relevant, though there are instances where they might have been better designed. Illustrations (Figs. 62 and 63) which assist considerably in the understanding of the construction of Ptolemy's projections are welcome.

This is not an easy book to read, and for this reason, and from a more material point of view, because of its high price, it can be recommended mainly to the serious student of geographical thought. R. M. P.

Landscape : As Developed by the Processes of Normal Erosion. By C. A. Cotton. 8½×5½. Pp. 509. Frontispiece. 375 figs. London : Cambridge University Press. Second edition, 1948. 47*s* 6*d.*

Though nominally a second edition, this work [see *S.G.M.*, 1942, 58 (*2*) : 82-83] has been so altered and expanded—to double its original size as to be virtually a new book, a text-book of geomorphology of ' normal ' process. The remainder of the subject is dealt with in his other two books [*S.G.M.*, 60 (*3*) : 89 ; 61 (*1*) : 30-31]. In spite of the popular title and the claim that the book will also serve the general reader, the closeness of its reasoning is such as to require the full attention of a student of the subject. So detailed and widespread is the study that inevitably points of difference will arise in the minds of some readers, but few will deny that the book as a whole is quite the most substantial of recent contributions to the subject.

Each chapter is followed by a bibliography, and the maps, photographs, and diagrams are in great number and of the highest quality. This, and the high-gloss paper, no doubt accounts for the unfortunately high price of the book. R. M.

Soils—Their Origin, Constitution and Classification: An Introduction to Pedology. By Gilbert Wooding Robinson, C.B.E., SC.D., F.R.S. 8½×5½. Pp. xxi+573. 22 figs. 9 plates. London : Thomas Murby and Co. Third edition, 1949. 32*s.*

Since the second edition of this book appeared in 1936 [see *S.G.M.*, 52 (*5*) : 349], there have been many important contributions to the science of pedology, and Professor Robinson has successfully incorporated much new material in this revision without destroying the balance of the book. The chapter on the pedogenic processes has been divided into two chapters dealing with soil formation under the headings

The Parent Material and Profile Development, many other chapters have been enlarged and five extra figures have been added, so that the text has been increased from 442 to 573 pages. There are also four more plates, including one showing the Great Soil Groups of the World, which is an appropriate frontispiece for a book providing an admirably succinct account of the development and chief characteristics of the soils of the principal world-groups and the system of classification. The constitution and physical and chemical properties of soils are described in a lucid and meticulous fashion.

Although the photographs are not quite so good as in the previous edition, the production of the book is excellent. A. M. S.

Géographie et Religions. By PIERRE DEFFONTAINES. 9×5½. Pp. 439. 6 figs. 24 plates. [Géographie Humaine, No. 21.] Paris : Librairie Gallimard, 1948. 750 *fr.*

Written by the Director of the French Institute in Barcelona, this is not a book to be read at a sitting or digested in a week. But it is eminently readable, despite the vast array of separate facts, for the clear and orderly arrangement is what one expects to find in a serious scientific work in French.

" The attitude of man to his environment, an attitude that is infinitely various, arises not solely from physical differences between regions, but no less from the delicate interpretations of his subtle psychology, and in these interpretations the share that falls to all that domain of thought that we call religious ideas is very great." That statement by the author might almost be regarded as the red thread that runs through the whole long exposition.

The main headings under which the matter is discussed are : Religion and human habitation : the dwellings of the living, the disposal of the dead, the home of divinity ; religion and population ; religion and the use of the soil ; religion and movements and migrations of men ; religion and modes of livelihood. Illustrations are drawn from all periods and all types of civilisation. The reading on which conclusions arrived at are based is enormous, and references are given in the form of footnotes on each page. R. T. C.

Our Evolving Civilization : An Introduction to Geopacifics. By GRIFFITH TAYLOR. 9×6. Pp. xv+370. 108 figs. London : Oxford University Press, 1946. 21*s.*

" Geopacifics," concludes the author, " is an attempt to base the teachings of freedom and humanity upon real geographical deductions . . . it is ' humanised geopolitics.' It shows how from a study of the World Plan, where the leading nations must arise . . . to *lead,* not to conquer. It shows how the conflicts based on racial differences are usually absurd," biologically. " It tries to understand the evolution of the Jewish folk, as the best answer to the poison of anti-Semitism." It explains the realities of climatology, " to aid the improvement of the *better* portions of the world first . . . and to advance in harmony with our environment. It is a material philosophy . . . (but) does not pretend to discuss those basic principles which properly belong to distinct *ethical* disciplines."

This work represents the synthesis of an adventurous geographer, acquainted with the old world and the new. It is aimed to reach the general reader, and should succeed, for it deals with matters of life and death, in a living way. It is the foundation of facts—mapped in space and graphed in time, or for comparison's sake—from which the author builds his pyramid-work, culminating in ideas, in illuminating hypotheses. The author would have us treat such ideas with the best form of scientific respect : truly critical examination. They deserve it. A. G.

Urban Geography : A Study of Site, Evolution, Pattern and Classification in Villages, Towns and Cities. By GRIFFITH TAYLOR. 8×5½. Pp. xv+439. Frontispiece. 190 figs. London : Methuen and Co. Ltd., 1949. 25*s.*

A new book by Professor Taylor is always an event, for one can look forward to finding new ideas stimulatingly and provocatively expressed, with, at the same time, a background of wide personal experience and immense industry. On reading *Urban Geography,* however, the reader is left with an uneasy feeling : are these qualities enough ?

In his introduction, the author stresses the difficulties of undertaking a survey of urban development, and from this there can be little dissent. There will, on the other hand, be much less agreement as to how far Professor Taylor's work actually advances the study of the subject, or enhances our knowledge of the factors controlling urban growth. In an approach to a new field, the reader expects, and should receive, a general and straightforward statement of principles, trends, and development. This, in the opinion of the reviewer, is conspicuously lacking in *Urban Geography*. Instead, we have a large and uneven corpus of descriptive material, some of it valuable, and some of it trivial. The student is overwhelmed by weight of information, which offers a guide to the Cambridge Colleges, to the ecclesiastical ornaments of Aklavik, and to the pronunciation of Davos, but provides little in the way of analysis or summary—less than one page, in fact, for methods of classification of towns.

The method of 'sample types,' elaborated by the author into a leading principle, is open to considerable objection when extensively employed. In geography, sampling is surely a device, or artifice, usable only when material is first surveyed or is not available ; and to make it the basis of a serious and sustained study leads to superficiality and a sense of bewilderment in the mind of the reader. What, for example, can one make of a list of seven representative types of urban settlement given as an introduction, when the very first instance quoted has only 25 inhabitants, the third 500, and the sixth 50 ? There is also a tendency to see in climate an explanation of all human activity : Professor Taylor openly avows himself a Determinist, and goes to considerable lengths to demonstrate the control of climate in the siting of cities—" there is a strong tendency for the closely clustered cities to keep to an environment expressed by a temperature around 50°, and a rainfall of between 33 in. and 43 in. per annum. Then follows the somewhat naïve reservation that " the presence of coal is of great importance." How can one express an opinion on the value of such an approach ? Possibly, and maybe with equally little justification, in the words of the reviewer of Wordsworth's *Prelude* : " This will not do."

W. B. F.

A Reference Guide to the Literature of Travel : Including Voyages, Geographical Descriptions, Adventures, Shipwrecks and Expeditions. By Edward Godfrey Cox. 10×7. Vol. I. *The Old World.* Pp. vii+404. University of Washington Publications in Language and Literature, Vol. 9, 1935. Reprinted by lithography, 1948. Including Tours, Descriptions, Towns, Histories and Antiquities, Surveys, Ancient and Present State, Gardening, etc. Vol. III. *Great Britain.* Pp. xiii+732. *Ibid.*, Vol. 12, 1949. Seattle : University of Washington Press. Vol. I, $6.00.

This is the most comprehensive bibliography yet published of travel literature, although for Scotland it is not so complete as the compilation by Mitchell and Cash issued by the Scottish History Society in 1917. Volume 3, dealing with Great Britain—Ireland is to be included in volume 4—is divided into 24 sections : I. Tours by Natives ; II. Tours by Foreigners ; III. Descriptions ; XI. Surveys ; XII. Geography ; XXI. Maps and Charts ; with other sections covering history, natural history, antiquities, memoirs, agriculture and related subjects either published before 1800 or dealing with conditions up to that date. The title of every book is given in full, second and subsequent editions are listed, and very useful notes on the contents of the book are added in most instances. In all, well over 4000 items are recorded. The fact that the book was prepared in Seattle, Washington, far from access to British libraries, may account for the omission of many books of equal value to those which have been included. The publications of some societies are listed, but not of others we would consider more important, and the selection of local books is rather limited.

Volume 3 contains an index of personal names, but even with this aid it is difficult to find a book, as the items in each section are listed under the date of publication. Thus the Agricola of Tacitus appears under the date 1581, the date of a published translation, and the thirteenth-century maps of Matthew Paris under 1928, the year when the British Museum issued facsimiles of the maps. There are some errors, *e.g.* it was the father of Mrs. Grant of Laggan who went to America in

1758 and not her husband, and the statute labour system was not a feudal survival, being introduced by statute in 1617, but these are minor points in a bibliography of this size and value.

Volume 1 contains bibliography of voyages, descriptions and expeditions relating to the old world covering Europe, Asia and Africa. D. G. M.

The Restless Voyage, being an Account by ARCHIBALD CAMPBELL, Seaman, of his Wanderings in Five Oceans from 1806 to 1812, written and published in Edinburgh in 1816 and supplemented and re-indited from Documents dealing with his Further History in Scotland and America, by STANLEY D. PORTEUS, D.SC. 7¼×5¼. Pp. 280. London : George G. Harrap and Co. Ltd. Sydney : The Australasian Publishing Co. Pty. Ltd., 1949. 10*s* 6*d*.

Professor Porteus has revitalised *A Voyage Round the World*, written by Archibald Campbell. The book, published in 1816, seems to have been a best-seller, but its language and moral tone suggest re-phrasing of Campbell's manuscript by his editor, and pruning and interpolation. *The Restless Voyage* represents a scholarly attempt to recover the original flavour, and can be strongly recommended. The largest section is devoted to Campbell's residence in Hawaii, and here Professor Porteus has retained the original spelling of proper names. Perhaps this is unfortunate. Polynesian names are difficult enough to carry in one's head without being plagued with variants such as Tamaahmaah instead of Kamehameha, Tamena for Kaahumanu, Owhyhee for Hawaii, etc.

Reintroducing the breath of life into Campbell's story as published one hundred and thirty-odd years ago has been a laborious task, but justified by results. The narrative holds the reader from start to finish and abounds in contemporary colour.

C. R. V. G.

One Horizon. By GEORGE BORODIN. 8½×5½. Pp. xiii+259. 17 photographs. London : T. Werner Laurie Ltd., 1948. 15*s*.

Scarcely has the author—" one of our most celebrated Harley Street surgeons " —left British waters on his wanderings, when he witnesses a rescue at sea, operates on a cabin boy, and himself suffers from an old gastric ulcer. He becomes a patient in an American hospital, is recognised and later invited to demonstrate a new operating technique of his own devising. Our surgeon continues a triumphal progress across America, then on to Hawaii and the South Seas and, of course, Bali. There is more operating in Australia, and so home by way of India and Egypt.

The reader is left wondering whether this book of travel is really a text-book surgery. Of course the author does not pretend to make any contribution to geography, and there is no map of his route. There must be readers who like this somewhat macabre kind of fare, but the reviewer regrets that he cannot appreciate it.

D. G.

Across the Great Deserts. By P. T. ETHERTON. 8½×5½. Pp. 184. 45 illustrations. 4 end-paper maps. London and Redhill : Lutterworth Press, 1948. 12*s* 6*d*.

Descriptive of the Sahara, the Kalahari Desert, and the Gobi Desert, this volume is profusely illustrated and attractively written in a popular way. But the endeavour to find colour in imposing references to fertility appears somewhat out of proportion in the complete picture. In the desert places of the world one expects to find no more than a scraping of fertility around well-heads and water-holes when new rain falls and makes possible a quick crop of sorts from a very spare and short-lived quantity of water nourishment. Desert presents as a whole a spectacle of abject poverty for the greater part of the year. Such growths as wheat-fields and orchards do not convincingly fit into the sand-blown, wind-swept wastes which remain the world's more appalling examples of lost land irrevocably killed out by perpetual drought, sun-blaze, and erosion.

A readable book containing much varied information which appears to require rather careful appraisement. A. B.

MAPS

Jancourt's Tourist Map and Guide Book to Europe. 8½×5. Pp. 72. Airway map. Railway and steamship tourist map. Insets: Europe and North Africa; from Europe to China and Japan via Trans-Siberia. Edinburgh and London: W. and A. K. Johnston Ltd., N.D. *7s 6d.*

The two maps of Europe on the Scale of 1 : 4,000,000 show all the air routes and the principal railway lines, with the time in hours between the main towns served and the railway mileages. One can see at a glance the routes available from one town to another and the time on the journey. The 72 pages of text include a brief guide to each country and much practical information about railway rates, currency restrictions and other matters of interest to the traveller.

D. G. M.

Bengal in Maps: A Geographical Analysis of Resource Distribution in West Bengal and Eastern Pakistan. By S. P. CHATTERJEE, M.SC., PH.D.(LOND.), D.LITT. (PARIS). Foreword by The Hon. Dr. Syama Prasad Mookerjee. 11¼×8¾. Pp. viii+105. 80 maps. Calcutta, Bombay, Madras: Orient Longmans Ltd., 1949. *Rs.* 18.

This volume of maps, issued with an enthusiastic foreword by the Minister of Industry and Supply to the Government of India, provides a very realistic picture of the social, industrial, and agricultural economy of Bengal. The unity of what is called in Map I "Divided Bengal in Divided India" is made patent, with the concentration of industry, much of it dependent on jute, in the older region of Western Bengal, and the rural prosperity of the densely peopled terrain of the active rivers of Eastern Pakistan, with its high percentage of lands that are cropped at least twice a year, and its virtual monopoly of the production of the profitable cash crops, of which jute is the foremost. The artificiality of the new boundaries is obvious, but the maps showing the location of the minorities do not suggest any other solution that would have been administratively feasible.

There is no map for the arable and out of cultivation, though the extent of current fallow in some of the areas of Central and Western Bengal for long has constituted a serious problem. The map based on the mortality figures of 1943 should have been excluded: It proves nothing more than that most deaths occurred in the areas of greatest density of population, and not "that the inhabitants of the densely populated parts were the worst sufferers," though in fact the famine did hit Eastern Bengal most severely on account of the failure of the cash crops of that year to pay.

There is a surprising number of minor inaccuracies which must detract from the value of Dr. Chatterjee's book. For instance, in the largest map showing towns, railways, and roads, four important subdivisional headquarters are not shown as such, but four small places in other parts of Bengal are given subdivisional status. The orthography of the place names is unusual and at variance with that adopted in the other maps, and there is inconsistency in his lettering. More care might have been expected of the Geography Department of the Calcutta University.

D. M. M.

THE ROYAL SOCIETY: NATIONAL COMMITTEE FOR GEOGRAPHY

On 6th February, 1950, the British National Committee for Geography held its first meeting since the International Congress recently held at Lisbon. The terms of reference of British National Committees set up by the Royal Society are in general "the promotion of the branches of sciences with which they are concerned, more especially as regards international requirements, the nomination of delegates to represent the United Kingdom at meetings of the Unions, and the initiation of proposals or questions for discussion at such meetings." As regards the International Geographical Union, the functions of the National Committees "shall be to promote and co-ordinate in their respective countries the study of the various branches of

Geography, with special reference to their international aspects." Each national committee, either singly or jointly with one or more other national committees, has the right to submit to the Union for discussion questions within the competence of the Union.

The membership of the British National Committee for Geography is as follows :—

Chairman : Brigadier R. A. Bagnold.

Ex-officio : Hydrographer of the Navy ; Director-General of the Ordnance Survey ; Director of Military Surveys ; President, Section E, British Association ; President of the Royal Geographical Society ; President of the Royal Scottish Geographical Society ; President of the Manchester Geographical Society ; President of the Geographical Association ; Professor L. Dudley Stamp (Vice-President of the International Geographical Union).

Royal Society : Brigadier R. A. Bagnold ; Sir Edward Salisbury.

Royal Society of Edinburgh : Mr. J. Bartholomew.

Royal Geographical Society : Professor C. B. Fawcett (Mr. Leonard Brooks, acting) ; Professor J. A. Steers ; Mr. J. M. Wordie.

Royal Scottish Geographical Society : Professor A. G. Ogilvie.

Institute of British Geographers : Professor R. O. Buchanan.

Geographical Association : Dr. A. Garnett.

Air Ministry : Air Commodore Merer ; Group Captain P. H. Cator.

Ministry of Civil Aviation : Mr. W. E. B. Griffiths.

Directorate of Colonial Surveys : Brigadier M. Hotine.

Ministry of Town and Country Planning : Dr. E. C. Willatts.

Additional Members : Professor H. J. Fleure ; Professor E. G. R. Taylor.

At its recent meeting the Committee recommended that Mr. L. P. Kirwan be made an additional member of the National Committee for the current period.

The Committee has decided to appoint a Sub-Committee, consisting of Brigadier R. A. Bagnold (Chairman), Professor Dudley Stamp (Vice-President of the Internation Union), Mr. L. P. Kirwan, Professor E. G. R. Taylor, and Mr. J. M. Wordie, to act on the behalf of the National Committee for Geography on the day-to-day International relations with the Union and keep the National Committee informed of all its activities.

One of the first duties which falls to the Sub-Committee is to arrange the machinery for contributing items to the News Letter which is being issued by the International Geographical Union, and to arrange for the distribution of the News Letter in this country. The first number of the News Letter has been published and the allocation to this country is likely to be in the neighbourhood of 250 copies. It is hoped to issue the News Letter twice a year.

The Executive Committee of the International Union of Geography is to meet in London from 28th to 30th August, 1950, and it is hoped to arrange a joint meeting with the British National Committee at the Royal Society.

The National Committee received a report on the activities of the International Geographical Union during 1949 and also the estimated budget for the next three years. The funds of the Union are derived from (1) subscriptions from the member countries and (2) a grant from Unesco. The main items of expense are for travel and editorial expenses.

Other matters which were discussed by the National Committee have been referred to the Sub-Committee and some will be discussed at the joint meeting with the Executive Committee of the Union in August.

The present officers of the International Geographical Union are as follows :—

Honorary President : Professor E. de Martonne.

President : Professor G. B. Cressey.

First Vice-President : Professor M. A. Lefèvre.

Vice-Presidents : Professor R. Almagia ; Professor H. Boesch ; Professor G. Kuriyan ; Professor C. Leite de Castro ; Professor O. Ribeiro ; Professor L. Dudley Stamp.

Secretary-General : Professor George H. T. Kimble.

The Headquarters of the Union are at the Department of Geography, McGill University, Montreal, Canada.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

PROCEEDINGS

MEETINGS OF COUNCIL were held on 10th January, 28th February, and 4th April, 1950.

Obituary.—The Council wish to record the deep sense of loss the Society has sustained by the death of Mr. GEORGE WALKER whose fifty-years' service with the Society included twenty-three years as Secretary. He was awarded the Diploma of Fellowship in 1946.

LECTURE SESSION, 1949-1950

Owing to the sudden illness of Dr. PATRICK W. R. PETRIE, O.B.E., M.B., CH.B., the Lecture on "Yemen" [see *S.G.M.*, Vol. 65, No. 3, pp. 173-174] was cancelled in Aberdeen and Dundee on 17th and 18th January, respectively.

In substitution, Professor V. C. WYNNE EDWARDS lectured on "A Trip to Labrador and Baffin Island" in Aberdeen, and Mr. S. J. JONES, M.A., lectured on "California" in Dundee, at very short notice.

GEOGRAPHICAL EXCURSIONS, 1950

6th May. Innerleithen—Tweed Valley—Broughton—West Linton.
Leader: Mr. R. M. PROTHERO, M.A.

10th June. Gifford—Lammermuirs—Dunbar—Haddington—Garleton Hills.
Leader: Dr. CATHERINE P. SNODGRASS, M.A.

LIVINGSTONE EXHIBITION, 1950

An Exhibition—"Livingstone the Explorer"—of Livingstone's Relics will be held in the Society's Rooms during the period of the Edinburgh Festival, 21st August to 9th September, 1950. Daily, from 11 a.m. to 7 p.m. Admission 1*s.*

NEWBIGIN PRIZE

1948 Award.—The Medal and Prize was awarded to Mrs. ISOBEL M. L. ROBERTSON, B.SC., for her essay "The Head-Dyke: A Fundamental Line in Scottish Geography," published in Volume 65, No. 3, of the *Magazine.*

1949 Award.—The Medal and Prize has been awarded to Mr. A. T. A. LEARMONTH, M.A., for "The Isle of Skye: A Geographical Essay on its Population," to be published in the next issue.

1950 Award.—A Bronze Medal and Money Prize will be awarded for the best Essay, suitable for publication in *The Scottish Geographical Magazine* and not exceeding 7000 words in length, on any subject relating to the geography of Scotland.

Essays, typed and with any illustrations prepared for reproduction, in envelopes marked "Newbigin Prize," must be lodged with the Secretary, Royal Scottish Geographical Society, Synod Hall, Edinburgh 1, on or before 31st October, 1950.

BOOKS ON SCOTLAND

For a national Society, the Scottish section of the library is relatively very small. The presentation of books on Scottish histories, topography, and geography, therefore, would be greatly appreciated.

FORMER ISSUES OF THE *S.G.M.*

The following numbers of *The Scottish Geographical Magazine* are out of stock and are very urgently required :—

Vol. **2**, No. 3; Vol. **13**, No. 11; Vol. **19**, Index; Vol. **20**, No. 5; Vol. **22**, No. 6; Vol. **26**, No. 3; Vol. **34**, Nos. 2, 3, 10, 12; Vol. **35**, Nos. 1, 3, 8, 9, 10, 11; Vol. **36**, No. 1; Vol. **37**, No. 1; Vol. **41**, Nos. 2, 6; Vol. **47**, No. 6; Vol. **58**, Nos. 1, 2, 3; Vol. **59**, Nos. 1, 2; Vols. **58-59**, Index; Vol. **60**, No. 2.

All bound volumes will also be gratefully accepted. It would be much appreciated if such copies of separate numbers and of volumes be handed without delay to the Secretary.